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Australia.

A REVIEW

OF

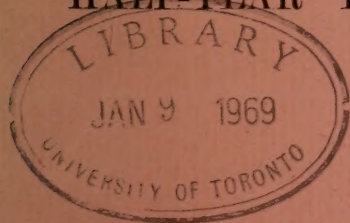
MINING OPERATIONS

IN THE

STATE OF SOUTH AUSTRALIA

DURING THE

HALF-YEAR ENDED DECEMBER 31st, 1908.



No. 9. **DO NOT REMOVE**
FROM THIS ROOM

ISSUED BY T. DUFFIELD, J.P., *Secretary for Mines,*

UNDER THE AUTHORITY OF THE

HONORABLE L. O'LOUGHLIN, M.P.,

Minister of Mines.

DEPARTMENT OF GEOLOGICAL SCIENCES,
UNIVERSITY OF TORONTO

Adelaide:

C. E. BRISTOW, GOVERNMENT PRINTER, NORTH TERRACE.

1909.

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PREFACE.

For the six months under review standard copper has averaged £61 1s. per ton, and for the whole year of 1908, £60 0s. 10d.

Further official reports on many mines are published with this number, as *addenda* to the "Record of Mines," and also the interesting results of the Government Geologist's recent examination of the valuable phosphate deposits of this State.

T. DUFFIELD, *Secretary for Mines.*

February 27th, 1909.

MINING OPERATIONS DURING THE HALF-YEAR ENDED DECEMBER 31ST, 1908.

AREA AT PRESENT HELD UNDER MINING ACTS (DECEMBER 31ST, 1908).

Nature of Holding.	Number.	Area.
Mineral leases	334	16,823 acres
Gold leases	98	1,803 "
Gold dredging leases	5	687 "
Miscellaneous leases	39	6,588 "
Mineral claims	416	13,728 "
Occupation licences	241	117 "
Search licences	66	58,880 "
Coal and oil claims	6	1,761 "
Total holdings	1,205	100,387 acres

REGISTERED FROM JULY 1ST, 1908, TO DECEMBER 31ST, 1908.

Mineral claims	103	3,120 acres
Gold leases	10	186 "
Mineral leases	10	310 "
Miscellaneous leases	1	493 "
Miners' rights	375	—
Search licences	42	40,320 "
Total	641	44,429 acres

MEN EMPLOYED.

The number of men employed in mining and mineral works, December 31st, 1908—

Copper	4,470
Gold	880
Salt	450
Silver-lead	50
Other minerals	500
Total	6,350

REPORTS.

PROPERTIES REPORTED ON DURING THE SIX MONTHS ENDED
DECEMBER 31ST, 1908.

By the Government Geologist (H. Y. L. Brown).

Recent mineral discoveries in the Northern Territory (Parliamentary Paper).

Additional notes on South Australian phosphate deposits PAGE.
21-25

By the Chief Inspector of Mines (W. H. Matthews).

	PAGE.		PAGE.
Kitticoola	26	Mount Malvern	27
Report on Maitland Coal Bore.			
And various suburban quarries.			

By the General Assistant (L. C. E. Gee).

Mutooroo	28	Bimba Hill	29
" West	28	Mary	29
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Winckler's Lead Show	28	Nil Desperandum	29
Queen Bee	28	Riddle's Claim	30
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Cobalt	28	Asbestos	30
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By the Inspector of Mines (H. Jones).

Tower Hill	30	Koske's Claim	38
Douglas' Claim	31	Golden Pole	38
Claim near Avondale	31	Hamilton	38
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Wild Dog	31	Warner's	39
Matheson's	31	Pinnacles	39
Avondale	31	Mount Shanahan	39
Blue Mount	31	Gow's Claim	39
Red Oxide	32	Parabarana	39
White Lead	32	Claim near Parabarana	39
Last Chance	32	Elsie Adair	39
Belliak	32	Diamond Jubilee	40
Claim adjoining Mount Lyndhurst		Mount Coffin	40
Mine	32	Claim W. of Diamond Jubilee	40
Great Mount Lyndhurst	32	Copper King	40
Lynda	33	Mount Bayly	40
Leslie's Well	33	Ajax	40
Benalack's	33	Workings near Copper King	41
Mount Burr	33	Warrioota	41
Mont Pelee	33	Lady Millicent	41
Paull's North	34	Angipena Treasure	41
Broken Range	34	Boulder Blocks	41
Phil Ma Cool	34	Peer Mahomet	42
South Creek	34	Mochatoona	42
Paull's Consolidated	34	Claim W. of Angipena Treasure	42
Claim near Red Bluff	35	Claim E. of Angipena Station	42
Claim 2 miles W. of Yudnamutana	35	Copper Queen	42
Blue Mine	35	Ediacara	42
Mount McDonald	35	Ediacara, claim adjoining	43
Dominick	35	Black Eagle	43
Willigun	35	Four-Mile Claim	43
Shamrock	35	Tarcoola Blocks	43
Grand Junction	36	Glenloth	45
Union Consolidated (Yudnamutana,		Wandilta	45
etc.)	36	Hamley	46
Lyndhurst S.A. Copper Co. (Daly,		Homeward Bound	46
etc.)	37	Klondyke	47
Cockscomb	37	Cockburn	47
Wealthy King	37	Poona	48
Black Queen	37	Kangaroo Island China Stone and	
Stanley	38	Clay	48

And inspections under Part XI. of the Mining Regulations.

GENERAL NOTES.

The average price of standard copper for the six months has been £61 1s. per ton ; for January-June the average was £59 0s. 9d., and for the whole year of 1908, £60 0s. 10d.

THE WALLAROO AND MOONTA MINES.—The report of the directors issued in September last contains the following information concerning operations on these celebrated mines :—

“ Wallaroo Mines.—The uncertainty as to what might result from the collapse of the copper market led to a very cautious policy in regard to underground operations. The stoping has been restricted to ground payable at the lower prices now ruling, and exploratory work confined to places giving the most encouraging prospect of immediate success. The conditions during the last month or two, however, have warranted the resumption of development work on a more satisfactory scale. After being in abeyance for eight months, the sinking of Taylor’s shaft was resumed in May, and it has now reached a depth of 2,310ft. Sinking operations at Young’s have been continued uninterruptedly, and the shaft is 1,945ft. deep. The 2,190ft. and 2,070ft. levels at Taylor’s have been driven E. and W., and the 1,950ft. and 1,830ft. W., disclosing lode material of quite average value. The 1,350ft. has been extended some distance E., and the ground is now being tested at the sides by the diamond drill. At Office shaft the 1,830ft. level E. has been opening slightly better veinstuff than at the 1,710ft. immediately above. Good progress has been made with the storage bins between the various levels at Taylor’s shaft, and it is hoped that they may be completed by the end of the year. A small amount of cross-cutting to reach the lode has been done at Office and Taylor’s shafts, while rising and winzing has been proceeded with as circumstances permitted. The erection of the new boilers in connection with the power plant has been completed. At the Devon concentrating plant the new transmission cable and two additional motors, each of 100-h.p., have been installed. The new ball mills have also been placed in position and are now at work. A belt conveyor is being provided for stacking the tailings from the Wilfley and card tables. The surface expenditure has been strictly confined to immediate needs, but it is expected that by the end of the year any arrears in general repairs which may have been occasioned by this course will have been quite made up. It is gratifying to note in connection with mining operations generally that the values of the veinstuff at the deepest levels have been satisfactorily maintained.

“ Moonta Mines.—The decline in copper prices pressed hardly on Moonta Mines, where much of the work in progress could only be profitable at high rates. By the greatest economy, however, ore-raising has been made remunerative, though on a reduced scale. The arches of ground at Taylor’s have continued to afford average value material, and substantial supplies have been drawn from Treuer’s shaft. A little stoping has been done at Stirling’s and Warmington’s to contribute to the total, while tribute operations have helped in the same direction wherever the circumstances and prospects have been favorable. Development work was almost at a standstill during the early months of the year, but this has since been gradually resumed, and the position is now fairly satisfactory. Treuer’s shaft has been deepened to 75ft. below the 600ft. ; driving and winzing have been carried on, and are in progress both there and on the W. lode at Taylor’s. While the conditions are such as to fully justify the opening of new ground, this can hardly be expected to prove of high grade. Careful filling and timbering have been necessary at Treuer’s shaft, as well as in connection with the arches at Taylor’s. Moonta Central, which was unwatered to the 180ft. last year and worked above that level, was again shut down in April of this year, and the water allowed to rise. The general surface operations have been controlled by the strictest necessities short of sacrificing true economy. The new card tables obtained last year have been installed,

and, together with the ball mill, are doing satisfactory work. Leaching operations at the cementation works have been confined to the tailings dumps, the slimes plant being idle."

On the Wandilta lode, near Kadina, after satisfactory boring operations by the Government, a prospecting shaft was sunk to water-level by the Mines Department. The prospects both for copper and gold are highly encouraging, and the sinking of a main shaft has been commenced. Details of the operations on this lode are given on pages 16 and 45.

The state of the copper market and the cessation of the Tasmanian Copper Company's buying and smelting operations has checked mining work in the North considerably, but confidence is being restored, and in many directions work and prospecting are again in progress.

The erection of smelters for the Union Consolidated Copper Company at Yudnamutana is proceeding apace. The company holds a number of well-known and valuable copper properties in the district, and with such large deposits of ore to work upon the venture should certainly be successful. Recent and highly encouraging reports from Inspector Jones will be found on page 36, and an illustration shows one of the lode outcrops.

The Lyndhurst South Australian Copper Company, holding the old Daly Mine in this locality, has confined its operations to extending open cuts and benches, and exposing ore ready to break down as soon as the Yudnamutana smelting works are completed. A photo is given of No. 1 bench, and for the inspector's report, *vide* page 37.

There are many other promising shows in the vicinity, and the new smelters should readily have abundant supplies of ore for treatment.

The Mary Mine, situated about 20 miles N.E. from Olary, was worked a short time ago by the Benowrie Copper Company, which ceased operations and wound up on account of the unsatisfactory state of the copper market. The place was then taken up by two men who had worked in the mine, and they were soon successful in striking a large and rich body of copper ore. This is of interest and importance as demonstrating how large bodies of payable ore may exist undetected in close proximity to what are generally regarded as shallow and low-grade deposits.

No work is in progress on the Burra Mine, and only a few tributers are working at the Kapunda.

On the N. portion of the Mount Grainger lease, a ferruginous formation composed of loose-jointed clayslate, quartz, gossan, and ironstone, and appearing to strike parallel to the Mount Grainger lode, has been opened up by prospectors, whose first parcel of 7 tons treated at the Petersburg Government works yielded 39ozs. 10dwts. 17grs. of gold, or at the average of 5ozs. 12dwts. 22grs. per ton.

At the Mount Grainger main shaft a new winding engine and vertical boiler have been erected; the shaft has been deepened 56½ft., making a total depth of 301ft. 6in., and at present there is 30ft. of water in the shaft.

The Tarcoola Blocks Company has been reconstructed, and a favorable report on the property from Inspector Jones will be found on page 43.

At King's Bluff the underlie shaft has been continued to 555ft., and a large supply of water obtained. A new 25-h.p. boiler for battery, &c., has been fixed in position, and the installation of an electric pumping plant was nearly completed at the end of the period under review.

At the Ajax the new vertical shaft has been sunk a further 20ft.; 300 tons ore have been stoped, and 50 tons treated yielded 30ozs. of gold.

Operations have been steadily pursued at the Queen Mine, near Echunga. The main shaft has been recovered, and the new underlie shaft sunk to 105ft.; the main drive at the 103ft. level continued N. 187ft. and S. 44ft.

Returns from Glenloth are very satisfactory. From Fabian's No. 3 307 tons have been treated for 381ozs. 6dwts. 18grs., valued at £1,057 2s. 1d.; the average being 1oz. 4dwts. 20grs. per ton. So far the deepest shaft is only 85ft., and the reef has every appearance of being persistent in depth.

From Simmons' and Kavanagh's claim, at Glenloth, 104 tons of ore have returned 117ozs. 16dwts. 20grs. of gold, valued at £445 17s. 4d.; an average of 1oz. 2dwts. 16grs. per ton.

At Kitticoola (Reedy Creek) Gold and Copper Mine the operations have consisted of exploration work only. Baker's lode—Unwatering Baker's shaft to 107ft. for examination; adit level E. of Reedy Creek driven 359ft. on Baker's lode; Masterman's lode—Some exploration work in upper levels—213, 180 N.; extending 180 N. a further 72ft. Three rises have been put up in level for testing values; main object, proving of sulphide zone in bottom levels; 360ft. S. driven 200ft.; old main underlie shaft sunk to 420ft. level; 420ft. level N. commenced. Sinking is continuing.

At the Mount Malvern Silver-lead Mine the main shaft has reached a depth of 315ft., and opening out has commenced at 215ft. and 306ft. to connect with levels in the old workings.

Reports on these mines by the Chief Inspector of Mines will be found on pages 26-27.

At the Garden Gully Freehold, Moppa, operations have been hampered by want of water.

Commonwealth (Wheal Ellen), near Strathalbyn, has started active work. Operations were commenced in September by reopening the old workings; since that time the old main shaft has been repaired, centred, divided into three compartments, and equipped with poppet heads, winding winch, and double cageway for handling ore; a five-head battery with boiler, engine, pump, tanks, &c., erected. A drive 171ft. long at a depth of 134ft. from the surface has been completed; office, storeroom, assay office, blacksmith's shop, and magazine erected and production started. The company has purchased a concentrating table to deal with the tailings from the battery and save the valuable silver-lead contained in them. It is proposed to shortly instal a pump in the main shaft to fork the water in the mine,

so that the silver-lead and copper lodes existing below the present water-level (200ft.) can be tested and exploited. Two hundred and forty-six tons of gossan ore have been passed through the battery, and 39ozs. of gold recovered.

Kangaroo Island China Stone and Clay Company. At the mine the machinery is in good order, and the excellent quality of the pure silica and fire-clay deposits continues. Additions have been made to the fire-brick works at Hog Bay, and bricks have been produced as required. A fair quantity of large fire-brick blocks have been made and successfully burnt on account of orders received.

All the materials for high-class pottery exist here. There is no doubt as to their purity and suitability, nor of the large quantities readily available. The time may be looked forward to when possibly the main china and pottery supplies of the Commonwealth may come from the Hog Bay district—the future Staffordshire of Australia.

Interesting reports by the Government Geologist on numerous phosphate deposits will be found on pages 21–25.

The difficulty of marketing large quantities of the local production in face of the competition from Christmas and Ocean Islands is considerably felt, but is a matter which will probably adjust itself in the future.

COPPER.

AVERAGE MONTHLY PRICE OF COPPER, JULY-DECEMBER, 1908.

	Standard.				Best Selected.		
	£	s.	d.		£	s.	d.
July	58	1	8	..	61	6	1
August	60	13	9	..	63	16	3
September	60	8	6	..	63	8	11
October	60	5	3	..	63	7	9
November	63	10	9	..	67	7	6
December	63	1	5	..	66	19	0
Average for the six months	61	1	0	..	64	4	3
Average for January-June	59	0	9				
Average for the year	60	0	10				

RANGE OF PRICES—

July 2nd	56	7	6
November 10th	65	2	6

AVERAGE PRICE OF STANDARD COPPER FOR THE LAST TEN YEARS.

	£	s.	d.		£	s.	d.
1899	73	13	9	1904	59	0	7
1900	73	2	5	1905	64	16	10
1901	66	19	1	1906	87	8	10
1902	52	8	3	1907	82	1	11
1903	58	3	2	1908	60	0	10

Average for the 10 years, £67 15s. 6d.

FROM THE S.A. "REGISTER," JANUARY 12TH, 1909.

The industrial metals are considered to afford a good index to the state of general trade. Copper, for instance, enters so largely into various manufactures that quiet business is bound to affect the demand for the metal, and prices in turn will be influenced. On the other hand, we have before to-day seen the effect upon trade of unduly high rates of commodities, consumption is thereby checked, and the upward movement comes to an end. Allowing for market manipulations, the state of trade in any given year may be pretty accurately gauged by a glance at eye catching diagrams, such as are published in this connection. Last year was a period of restricted trade. The Wall Street collapse occurred about the end of the first quarter of 1907, and business conditions all over the world had to be adjusted to meet the new state of affairs. This took some time, and then there was a pause. No one knew exactly what was going to happen. In any case, as far as America was concerned, there was the Presidential election towards the close of 1908, and traders were not disposed to enter into new undertakings until they knew who was going to be the new occupant of White House. Then Germany had to pass through a period of liquidation, and in Great Britain there was a period of reaction. In the circumstances the prices of metals took the course that might have been expected during 1908. While fluctuations were not so violent as in the previous year, the tendency was for the most part downward, with some recovery after the turn of the half-year.

The diagrams which are published herewith are more eloquent than many words could possibly be. They show the monthly averages of the price of industrial metals during the past two years, and the contrast is most interesting. For more exact comparison reference must be made to the tables which follow, showing the monthly averages worked out to the nearest penny. At the beginning of 1907 the top of the market had been passed. With the exception of lead, which did not suffer from adverse market conditions till later, values dropped fairly consistently each month, though at the same time they were still at a highly payable level. At the commencement of 1908 it would scarcely have been correct to say that values had been cut in half, though that is not far from the truth. The recent recovery causes the curves in the respective years in some cases to intersect.

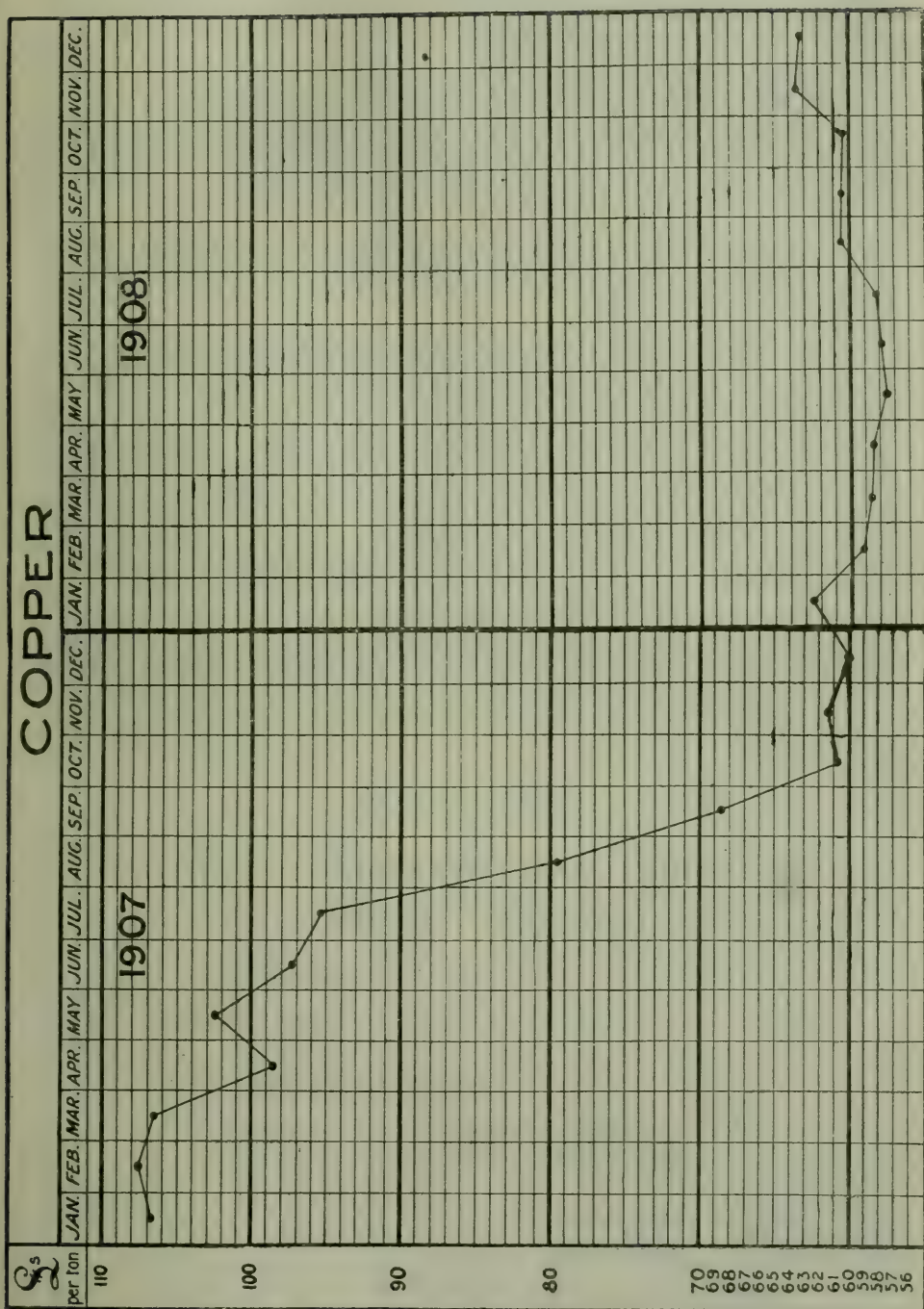
COPPER.

South Australia is most interested in the bronze metal, and in the following table is shown the monthly average price for the past three years:—

	1906.				1907.				1908.		
	£	s.	d.		£	s.	d.		£	s.	d.
January	79	2	3	..	106	17	1	..	62	9	9
February	78	6	9	..	107	10	9	..	59	1	0
March	81	4	1	..	106	13	0	..	58	15	8
April	84	19	4	..	98	13	6	..	58	7	8
May	85	0	9	..	102	8	2	..	57	10	9
June	84	3	2	..	97	4	3	..	57	19	8
July	81	4	11	..	95	5	9	..	58	1	8
August	84	0	7	..	79	17	5	..	60	13	9
September	87	19	4	..	68	8	9	..	60	8	6
October	97	6	5	..	60	17	6	..	60	5	3
November	100	6	2	..	61	3	8	..	63	10	9
December	105	7	8	..	60	0	2	..	63	1	5

It is not the purpose here to attempt to forecast the future—a difficult task at all times—but the following, to hand by last week's mail, may be of interest. It is by the Butte correspondent of *The London Mining Journal*:—

Mr. W. A. Clark, former United States Senator, from Montana, owner of the San Pedro Railroad, the United Verde, and other copper mines, who has been in Butte for several days, says he looks for a 15 or 16 cents copper market very soon, and he repeats what he said a year ago, that copper producers would never again commit the folly of allowing the metal price to go to unreasonable figures. "It would be a great misfortune to allow it to go to any extreme figure," he said. "At 15 or 16 cents domestic consumption can be depended upon for a steady demand, and our foreign market, which is now good, will hold good. The European stock in sight is less than 100,000,000lbs., not



more than a month's supply; but the home consumption is not much more than 40 per cent. of normal, while the present production is about 80 per cent. of the normal, taking 1907 as a basis. American dealers have no large surplus on hand, and as business conditions improve they will be in the market for larger purchases. We are not likely to repeat the blunder of 1907, and have copper go to abnormally high figures, with a certainty that a reaction would follow and demoralise the copper business. I look for a good, steady market around 15 cents, and the producers can make money at that."

Senator Clark's assertion that copper producers were not likely to repeat "the blunder of 1907" and permit copper to go to abnormally high figures, recalls his statement (says the correspondent) made at the beginning of the panic, when copper began its rapid descent from 26 cents. At that time he spoke as one having authority, and it was generally recognised that he was speaking for producers generally when he declared that the price of copper would not be permitted ever again to go above 16 to 18 cents, and that the small operators would find it impossible to compete or contribute to the demoralisation of the market, because at the price that would be maintained the numerous small operators could not produce copper at a profit.

It may be remarked that 15 or 16 cents per pound is equivalent to around £70 per ton for standard, a level which could not be regarded otherwise than satisfactory by both producers and consumers. Along similar lines the following from a New York metal circular is worth reading:—

The American copper industry has been strengthened by the changed position of the producers, who, by their sales, have been put into a comfortable position, and can afford to hold their remaining stocks and output firmly. Even should the expected revival of consumption fall below expectations, they have now partners in the large consumers, in the carrying of the surplus, until the expected arrives, as none of these large consuming purchasers will come again on the market. It would seem as though the situation must now devolve itself into one of waiting, until the outlook for a largely increased consumption is changed from an expectation into a positive reality. Meanwhile, while this is being determined, the speculative London market and second hands here will probably, in their desire to secure profits, cause a further reaction in prices. Except for the easier producers' position, and some increase in consumption, and good prospects in this direction, the situation of copper in the past closely follows that of iron, and no less an authority than the U.S. Steel Corporation is on record as saying, two days ago—"We are now working 60 per cent. capacity, and I look for a gradual improvement until about the middle of next summer, when business will reach a normal and healthful state." With therefore a good production of copper at record figures, and being turned out at a good profit, and with every prospect of increasing, with very large stocks being carried abroad by consumers, dealers, speculators, and our own selling companies; with the dull condition of trade in Great Britain, and the political unsettled state of affairs on the Continent; it would seem that enough uncertainty still remains to make conservative action and estimate of the future most necessary in copper.

The "Register" article also contained interesting details and diagrams concerning lead, spelter, and tin.

CRUSHING AND CYANIDING PLANTS.

RETURNS FROM GOVERNMENT CRUSHING AND CYANIDING PLANTS FOR THE HALF-YEAR ENDED DECEMBER 31st, 1908.

Name of Mine.	Locality.	Ore Treated.	Total Gold Recovered.	Value.	Average Yield per Ton, in Shillings.
		Tons cwt. qrs.	Ozs. dwts. grs.	£ s. d.	
MOUNT TORRENS.—GOVERNMENT BATTERY AND CYANIDE PLANT.					
Mount Torrens.....	Mount Torrens....	43 10 0	1 15 20	7 3 4	3½
Dan O'Connell.....	Blumberg.....	6 5 0	1 19 14	7 5 7	22
Hynes' Property....	".....	5 5 0	0 12 20	2 7 6	9
Mount Torrens.....	Mount Torrens....	5 10 0	0 13 5	2 8 10	9
Phoenix Gold Mine..	Barossa.....	16 0 0	4 13 3	14 13 4	18
Mount Torrens.....	Mount Torrens....	31 0 0	1 3 6	4 13 0	3
Total.....		107 10 0	10 17 20	38 11 7	7
Grand total since starting of battery ..		9,097 2 3	5,159 18 20	19,477 5 8	42½

Name of Mine.	Locality.	Ore Treated.	Total Gold Recovered	Value.	Average Yield per Ton, in Shillings.
		Tons cwts. qrs.	Ozs. dwts. grs.	£ s. d.	

New Milo	Wadnaminga	5	15	0	3	2	10	11	6	7	40
Dunn's Homeward Bound	Mannahill	1	12	0	21	11	23	86	11	11	1,140
New Milo	Wadnaminga	6	6	0	5	9	3	18	3	9	57
Nectar	Mannahill	2	15	0	6	1	20	23	17	3	173
Dunn's Homeward Bound	"	3	0	0	2	8	0	9	12	0	64
Klondyke	"	4	12	0	8	0	5	31	6	4	136
Dunn's Homeward Bound	"	5	9	0	1	11	20	6	4	5	22 $\frac{1}{2}$
Emery	Bimbowrie	1	0	0	1	11	23	5	7	10	108
Mount Grainger	Mount Grainger ..	7	0	0	39	10	16	156	6	10	447
Dunn's Homeward Bound	Mannahill	6	11	0	21	8	11	85	2	2	144
Nectar	"	2	12	0	8	8	14	32	14	4	152
Golden Crown	Hallett	4	4	0	0	16	14	3	1	2	14
Klondyke	Mannahill	2	0	0	2	19	12	11	12	7	116
Dunn's Homeward Bound	"	5	7	0	12	5	20	48	15	0	180
Lux	Olary	5	7	0	1	9	22	4	16	1	17
Total		63	10	0	136	16	17	534	18	3	168
Grand total since starting of battery ..		3,616	4	0	3,246	7	15	11,985	11	0	66

GLENLOTH.—GOVERNMENT BATTERY.

No. 16 parcel—Royal Tiger	5	5	0	2	16	14	9	16	1	38 $\frac{1}{2}$
“ 17 “ Nil Desperandum	8	0	0	3	17	5	13	17	3	34 $\frac{1}{2}$
“ 18 “ New Glenloth Co. (Fabian's), No. 3	65	0	0	56	9	18	197	15	10	61
“ 19 “ “ “	103	0	0	60	10	17	212	14	6	41
“ 20 “ Simmons and Kavanagh ..	50	0	0	77	11	10	293	15	11	117 $\frac{1}{2}$
“ 21 “ Koska (Fabian's), No. 1....	6	0	0	5	4	20	19	2	4	64
“ 22 “ Blue Peter	4	10	0	1	0	10	3	15	3	16 $\frac{1}{2}$
“ 23 “ New Glenloth Co. (Fabian's), No. 3	32	0	0	117	1	16	267	6	11	167
“ 24 “ “ “ “	70	0	0	113	15	0	297	12	0	85
“ 25 “ T. Collins.....	5	0	0	2	15	2	8	10	1	34
“ 26 “ New Glenloth (Fabian's), No. 3	37	0	0	33	9	15	111	18	6	60 $\frac{1}{2}$
“ 27 “ Simmons & Kavanagh	54	0	0	40	5	10	152	1	5	56
Total.....	439	15	0	514	17	17	1,588	6	1	72
Grand total to December 31st, 1908....	1,430	10	6	1,151	17	11	3,901	9	11	54 $\frac{1}{2}$

GOVERNMENT BATTERY AND GRANITE PLANT.				GOVERNMENT BATTERY AND GRANITE PLANT.				
Government Mine	8	10	0	21	6	18	72 16 11	172
Curdnatta	9	0	0	15	3	4	55 0 8	122
Government Mine	4	10	0	4	10	18	14 19 1	67
“ “	5	10	0	2	15	9	9 18 10	36
Hisgroves'	3	15	0	2	15	8	8 13 4	46
Total	31	5	0	46	11	9	161 8 10	103
Grand total since starting of battery ..	2,051	10	0	2,509	11	20	8,873 1 8	87

RETURNS FROM CRUSHING AND CYANIDING PLANTS (OTHER THAN GOVERNMENT) FOR THE HALF-YEAR ENDED DECEMBER 31st, 1908.

Name.	Ore Treated.	Total Gold Recovered.	Value.	Average Yield per Ton, in Shillings.
	Tons cwt. qrs.	Ozs. dwts. grs.	£ s. d.	
DUNN'S HOMEWARD BOUND BATTERY, MANNAHILL.				
Battery treatment	209 0 0	80 10 0	300 0 0	29
Total	209 0 0	80 10 0	300 0 0	29

AJAX BATTERY, NEAR WAUKARINGA.				
Battery treatment	50 0 0	30 0 0	114 0 0	45½
Total	50 0 0	30 0 0	114 0 0	45½

KING'S BLUFF BATTERY, NEAR OLARY.				
Battery treatment—				
Raised from leases	20 0 0	101 9 0	331 0 0	331
From dump	130 0 0	29 0 0	93 0 0	14
Raised from claims	25 0 0	25 0 0	91 0 0	72½
Total	175 0 0	155 0 0	515 0 0	59

TARCOOLA BLOCKS COMPANY'S BATTERY AND CYANIDE PLANT.				
Battery treatment	*140 0 0	234 0 0	625 0 0	—
Total	140 0 0	234 0 0	625 0 0	89
Grand total since starting of Tarcoola Blocks Company's battery, May 10th, 1901, to December 31st, 1908	27,448 0 0	37,228 0 0	115,622 0 0	84

* Approximate.

TOTAL BATTERY AND CYANIDE RETURNS FROM ALL PLANTS FOR THE SIX MONTHS ENDED DECEMBER 31st, 1908.

Name.	Ore Treated.	Total Gold Recovered.	Value.	Average Yield per Ton, in Shillings.
	Tons cwt. qrs.	Ozs. dwts. grs.	£ s. d.	
Mt. Torrens Government Battery	107 10 0	10 17 20	38 11 7	7
Petersburg Government Battery ..	63 10 0	136 16 17	534 18 3	168
Tarcoola Government Battery	31 5 0	46 11 9	161 8 10	103
Glenloth Government Battery	439 15 0	514 17 17	1,588 6 1	72
Dunn's Homeward Bound Co.	209 0 0	80 10 0	300 0 0	29
Ajax Battery	50 0 0	30 0 0	114 0 0	45½
King's Bluff Company	175 0 0	155 0 0	515 0 0	59
Tarcoola Blocks Co.'s Battery	140 0 0	234 0 0	625 0 0	84
Total	1,216 0 0	1,208 13 15	3,887 4 9	64

NORTHERN TERRITORY OF SOUTH AUSTRALIA.

ARLTUNGA, MACDONNELL RANGES.—GOVERNMENT BATTERY AND CYANIDE PLANT.

The Macdonnell Ranges, although within the boundaries of the Northern Territory, and coming under the operation of the Northern Territory Mining Act, yet geographically belongs to South Australia proper. All business is done from Adelaide, and the administration of the Mining Act south of the 19th parallel of latitude is conducted by the Hon. Minister controlling the Northern Territory, with the help of a resident warden at Arltunga.

Name.	Ore Treated.	Total Gold Recovered.	Value.	Average Yield per Ton, in Shillings.
	Tons cwt. qrs.	Ozs. dwts. grs.	£ s. d.	
New Venture (alluvial)	50 0 0	5 18 11	20 4 3	8
"	4 10 0	0 4 11	0 14 9	3 $\frac{1}{3}$
White Range, Luce's	10 1 0	15 0 8	56 13 2	112
" Associated	10 7 0	9 15 6	38 4 10	74
"	7 6 0	1 3 6	3 15 10	10 $\frac{1}{2}$
" Luce's	11 18 0	8 19 19	33 18 7	83
"	11 18 0	22 2 20	85 17 5	152
Various	3 3 0	2 13 1	9 14 7	60
White Range, Associated	13 0 0	27 7 9	106 3 4	163
" Luce's	3 16 0	7 4 1	28 4 6	148
"	9 6 0	13 1 20	47 18 0	113
Round Hill	9 9 0	11 6 21	44 10 0	92
White Range, Luce's	20 1 0	19 14 20	74 5 2	73
Experiment	4 8 0	0 17 17	2 19 6	13
Valentine	8 2 0	5 8 6	14 13 7	36
White Range, Luce's	27 10 0	29 0 16	100 2 1	70
Various	4 9 0	1 0 1	2 17 1	12 $\frac{1}{2}$
White Range, Extended	3 16 0	2 19 12	10 16 0	57
"	4 13 0	5 7 13	19 0 0	80
" Joker	4 12 0	7 14 0	30 8 5	132
Arcoonga	4 8 0	5 0 10	8 10 1	40
White Range, Luce's	3 16 0	5 1 9	17 14 11	93
"	9 1 0	10 13 16	36 18 3	81
"	5 18 0	13 17 14	50 4 0	170
" Extended	4 0 0	6 11 5	23 4 0	116
" Luce's	15 3 0	16 10 1	61 6 11	80
Arcoonga	4 16 0	2 5 10	7 18 11	32
White Range, Associated	10 11 9	8 11 22	29 6 4	56
Valentine	4 16 0	1 15 1	4 5 5	16 $\frac{2}{3}$
White Range—Luce's	9 6 0	11 12 12	43 7 1	40 $\frac{1}{3}$
"	10 15 0	16 17 13	64 5 4	120
" Joker	3 19 0	6 8 13	25 5 8	130
" Luce's	8 4 0	10 0 18	35 15 6	87
Government Mine, No. 1	9 2 0	5 18 7	12 5 6	26
White Range—Associated	3 11 0	3 7 7	12 4 6	68
" Luce's	18 14 0	63 15 18	237 7 6	255
Total	344 5 0	387 7 1	1,401 1 3	81
Grand total since starting of battery to December 31st, 1908	9,796 7 3	12,058 12 17	44,792 2 10	91

WINNECKE'S DEPOT GOVERNMENT BATTERY, MACDONNELL RANGES.

The following return gives the total to December 31st, 1908, of the ore treated since this battery was taken over by the Government:—

Parcel No. 1—Great John Bull ..	9 14 0	1 19 4	7 9 10	15
" " 2—Various	16 11 0	1 9 1	4 13 3	6
" " 3— "	9 5 0	2 9 3	9 7 8	20
" " 4—Big Gun	4 0 0	2 2 0	7 15 10	39

WINNECKE'S DEPOT, GOVERNMENT BATTERY—*continued.*

Name.	Ore Treated.			Total Gold Recovered.			Value.			Average Yield per Ton, in Shillings.
	Tons	cwts.	qrs.	Ozs	dwt.	grs.	£	s.	d.	
Parcel No. 5—Coronation	13	15	0	5	11	13	19	6	5	28
“ “ 6—Reward	11	0	0	9	16	16	38	2	3	69
“ “ 7— “	13	0	0	5	8	9	20	18	9	32
“ “ 8—Coronation	12	0	0	7	19	18	28	4	8	47
“ “ 9—Reward	35	0	0	27	9	7	104	19	11	60
“ “ 10—Coorong	50	0	0	15	10	2	60	17	2	24
“ “ 11—Junction	12	0	0	0	12	21	2	7	1	4
“ “ 12—Coronation	24	0	0	10	17	5	38	17	11	32½
“ “ 13—Golden Junction ..	5	0	0	6	7	13	24	11	7	98
“ “ 14—Reward	8	10	0	4	17	23	18	18	6	44
“ “ 15—Coronation	5	10	0	2	1	18	6	12	6	24
“ “ 16—Reward	10	0	0	1	6	6	4	11	0	9
“ “ 17—Coronation	18	0	0	3	0	10	9	5	9	10
“ “ 18—Black Eagle	2	10	0	1	8	12	5	12	6	45
“ “ 19—Golden Junction ..	4	0	0	3	16	8	14	13	11	73
Total	263	15	0	114	4	7	427	6	6	32½

GOVERNMENT BORING OPERATIONS.

No. 1 Government drill has done 1,030ft. of boring during the half-year. No. 5 bore. Wandilta (*vide* page 14, “Review” No 8), was continued to 1,382ft. The drill was then removed to the Wallaroo Extended property, and a bore hole put down for 377ft.; the plant then returned to Wandilta, and No. 6 Wandilta bore was started.

No. 5 Wandilta bore (completion).

806ft.

to Country rock
1,159ft.

At this depth the lode, known as the old line of lode, was met with, but proved to be mostly mundic. The bore was continued to 1,382ft. without further development, and then discontinued.

Wallaroo Extended bore.—Angle of bore, 84°.

Surface	Loam and limestone	325ft. 6in.	
to	Quartzite	to	Quartzite
280ft.		329ft.	
to	Lode showing copper ore of	to	Solid mundic
285ft.	low value on the whole	331ft. 7in.	
to	Quartzite	to	Quartzite
324ft.		377ft.	Bore discontinued
to	Solid mundic		

No. 6 Wandilta bore (in progress).—Site selected to cut the lode met with in the prospecting shaft at 250ft. from surface; angle of bore, 84°.

Surface After passing through surface loam and limestone, entered sandstone mixed to with quartz and iron stains, which continues at 77ft. depth reached at 77ft. end of half-year.

Prospecting Shaft.—Report of the foreman of drill operations (Mr. A. W. Matthews).—This shaft was started 45ft. E. of No. 5 bore with the idea of locating the caps of the various lodes passed through in this bore.

Size of shaft, 6ft. x 4ft. within timbers; depth, 60ft., where crosscuts were made E and W. for a total distance of 175ft., disclosing several large calcite formations and opening up the cap of a calcite lode 5ft. wide, which carries very rich bunches

of grey ore and green carbonate. It strikes about N.W. and dips about 1 in 3 S.W. Drives were made on it—N., 82ft., and S., 50ft.—both showing bunches and seams of rich ore. Three rises were also put up, two of which showed green carbonate and grey ore. Two winzes were also sunk as deep as the water would permit, and disclosed very rich ore on the bottom, assays of samples taken by the Chief Inspector of Mines going as high as 46 per cent. copper and 8dwts. gold per ton. It having been decided to sink the shaft below water-level to prove this lode, it is now being cut down to 11ft. by 4ft. 6in. within timbers and prepared for the reception of winding and pumping plant.

Samples taken by Chief Inspector of Mines.—Four samples from bunches of ore in N. drive—Gold, 1dwt. to 3dwts. per ton; copper, 3·6 per cent. to 18·9 per cent. Six samples from winze—Gold, 1dwt. to 8dwts. per ton; copper, 21 per cent. to 46·1 per cent.

No. 2 Government drill, working at Noarlunga on behalf of the Noarlunga Coal Company.

No. 5 bore (completion).—Situated about half a mile from Port Noarlunga. (*Vide* page 15, "Review" No. 8.)

91ft. 10in.		151ft. 10in.	
to	Hard ironstone conglome-	to	Blue clay
92ft. 11in.	rate	202ft. 2in.	
to	Brown sandstone		Purple slates, fairly soft at
102ft. 7in.			first, but much harder in
to	Dark-brown shale and sand	to	the bottom. Dip of
135ft. 10in.			strata, about 45° all
to	Drift sand		through
146ft. 10in.		373ft.	Bore discontinued
to	Shale, interstratified with		
151ft. 10in.	layers of fine sand		

INSPECTION OF QUARRIES.

In consequence of the appalling frequency of serious accidents occurring at quarries the Legislature passed an Act, No. 858 of 1904, bringing quarries in the same category as mines as regards the controlling hand of the Inspector of Mines. Where necessary, quarries have been visited by the Chief Inspector (Mr. W. H. Matthews) who, in some cases, found additional precautionary measures necessary. His requisitions in this respect have in all cases been complied with.

SUBSIDIES.

The Legislature provided in the Mining Act, 1893, and in previous measures for the encouragement of mining.

The following schedule shows what subsidies have been paid from the inception of the system to June 30th, 1908, and the sums repaid. In the ordinary way these repayments are made from profits—50 per cent. of such profits being devoted to repayments. In two instances only have the profits won enabled full repayment to be accomplished—the Crystal Mine, at Echunga, which repaid £76 7s. 6d. from that source, and the once-famous New Alma and Victoria Mine, Waukaringa, which repaid in full the first subsidy, £3,000. The remainder of the recoveries was derived from sales of mining plant held as security. The total subsidies advanced is £46,231 10s. 4d., of which £6,055 12s. 6d. has been recovered, leaving a debit balance of £40,175 17s. 10d. Portion of this outstanding debt is represented by machinery that has fallen into the hands of the Government; add to this the value of the metals won, and the State in general will probably have benefited beyond the money value of the debit balance.

**ENCOURAGEMENT OF MINING.—STATEMENT OF SUBSIDIES PAID
FROM COMMENCEMENT TO DECEMBER 31st, 1908.**

Locality.	Name of Company or Person to whom Subsidy Granted.	Amount Advanced.	Amount Repaid.
		£ s. d.	£ s. d.
Algebuckina	Algebuckina Gold Mining Syndicate	52 10 11	52 10 11
Barossa	Barossa Enterprise Gold Mining Co.	232 2 6	—
"	Enterprise Copper Mining Co., N.L.	150 0 0	—
"	Enterprise Excelsior (Barossa Amalgamated)	2,000 0 0	—
"	Lady Alice Gold Mining Co.	1,797 2 3	—
"	Victoria Hill Amalgamated Gold Mining Syn.	38 12 6	—
Bimbowrie	Mount Victoria Mine	50 0 0	—
Blackwood	Mount Malvern Silver Mining Co.	491 3 6	—
Blinman	Nilpena Copper Mining Co., Ltd.	290 5 3	—
Burr Well	Paull's Consolidated Copper Propy., N.L. ..	525 0 0	—
Callington	Callington Copper Mining Co.	148 8 7	—
"	Paringa Mining Syndicate	399 16 8	244 0 0
"	Paringa and West Kanmantoo Consolidated Copper Mine, N.L.	358 15 5	—
"	Pioneer Gold and Copper Mining Syndicate	95 15 6	—
Clarendon	Mount Malvern Silver-lead Mining Co., N.L.	1,301 6 1	—
Currency Creek	Currency Creek Copper Mining Co.	28 6 5	—
Echunga	Crystal Gold Mining Co.	563 17 6	176 7 6
"	Wolters, F. C., & Co	25 0 0	—
"	Echunga Proprietary Hydraulic Gold Sluicing Co., N.L.	500 0 0	—
Ediacara	Ediacara Consols Silver Mining Co., N.L. ..	651 12 1	375 17 0
Farina	Warra Warra Propy. Copper Mines, N.L. ..	322 4 11	322 4 11
Fifth Creek	Fifth Creek Central Silver and Copper Mining Co., N.L.	253 2 4	—
"	Stainbank, A. T.	70 14 11	—
Fortress Hill	Fortress Hill Mining Syndicate	60 0 0	—
Glenloth	Glenloth Mining, Battery, & Options Co., N.L.	515 4 7	515 4 7
"	Glenloth Wells Pioneer Blocks Co., Ltd.	100 0 0	22 18 5
"	Hakendorf, C. H., and Williams, J. (Glen- markie Mine)	200 0 0	—
Glen Osmond	Eagle Silver Mining Co., Ltd.	500 0 0	—
Gumeracha	Gumeracha Gold Mining Syndicate	75 0 0	—
"	Watt's Gully Gold Mining Co.	50 0 0	—
"	Watt's Gully Reef Claims	50 0 0	—
Hahndorf (near)	Mount Pangau's Gold Mining Co.	56 1 4	—
Kadina	Copper Hill Mining Co., N.L.	391 15 0	—
"	Walleroo Central Mining Co., N.L.	348 3 0	—
"	Polmear, W. J. L.	257 14 4	—
Kangaroo Island	Kobinoor Gold Mining Co., N.L.	137 17 0	—
"	Kobinoor Mine (H. G. Taylor)	162 3 0	—
Kuitpo, Hundred of	Blackfellow's Creek Gold Mining Co., Ltd. ..	660 6 7	35 0 0
"	McMurtie's Claims	199 19 11	—
"	Mount Monster Gold Mining Syndicate	350 0 0	—
Leigh's Creek	Leigh's Creek South Coal Mining Co., N.L.	95 16 4	95 16 4
Maitland	Parara Mining Co., N.L.	449 16 8	—
Mannahill	Royal Charlie Gold Mining Co.	153 18 5	—
"	Victoria Tower Mining Co., N.L.	345 18 9	90 0 0
"	Westward Ho Mine (Dr. H. Dixon)	1,000 0 0	—
Mount Fitton	Northern Mining and Smelting Co., N.L. ..	350 0 0	—
Mount Grainger	Ireby Gold Mining Syndicate	35 4 3	—
"	Mt. Grainger Ironclad Gold Mining Syn., Ltd.	21 18 10	—
"	Heithersay, J., Mt. Grainger Medora Mines	77 7 7	—
"	New Mount Grainger Gold Mines, N.L.	393 7 1	220 0 0
"	Medora and Grainger Gold Mines Syndicate, N.L.	327 4 2	—
Mount Pleasant	Duke of Cornwall Gold Mining Syndicate ..	458 17 4	38 5 0
Mount Torrens	Mount Torrens Gold Mining Co.	1,000 0 0	—
Musgrave Ranges	Musgrave Ranges Prospecting Association ..	47 2 0	—
Mutooroo	Mutooroo Copper and Silver Mining Co., Ltd.	500 0 0	500 0 0
Myponga	Wohler, H., & Co.	20 0 0	—
Nackara	Nackara Proprietary Copper Mining Co., N.L.	100 0 0	—
"	Nackara Proprietary Gold Mining Syndicate	100 0 0	—
Nairne	New Banksia Gold Mining Syndicate	250 0 0	—
"	North Nairne Gold Mining Co.	500 0 0	—
New Luxemburg	Mingary Gold Mining Co.	650 0 0	—

ENCOURAGEMENT OF MINING.—STATEMENT OF SUBSIDIES PAID—*continued.*

Locality.	Name of Company or Person to whom Subsidy Granted.	Amount Advanced.	Amount Repaid.
		£ s. d.	£ s. d.
New Luxemburg	Queen Bee Mining Co., N.L.	250 0 0	250 0 0
Olary	King's Bluff G.M. Co., N.L.	115 15 2	—
Palmer (near)	Bevilacqua & Angel	57 18 0	—
Port Lincoln	Lady Franklin Syndicate	200 0 0	40 0 0
Prospecting in north- west of State	North-West and West Australian Pros. Co..	104 9 7	—
Prospecting on proposed line to Queensl'd Border	Wheal Turner Copper Mining Co., Ltd.	1,000 0 0	—
Quorn	Quorn Manganese and Silver Mining Co. ...	10 9 10	—
Sliding Rock	Sliding Rock Copper Proprietary, N.L.	2,000 0 0	5 12 0
Tarcoola	North-West Prospecting Association, N.L.	150 0 0	—
"	Tarcoola Blocks Gold Mining Co., Ltd.	3,495 5 2	—
"	Tarcoola Enterprise Gold Mining Co., N.L.	100 0 0	19 10 4
"	Tarcoola Proprietary Gold Mines, N.L.	150 4 4	9 15 0
Teatree Gully	Teatree Gully Gold Mining and Pros. Assn.	234 5 7	—
Teetulpa	Great Ironclad Gold Mining Co.	218 6 9	—
"	Morning Star Gold Mining Co.	68 4 6	—
"	Nil Desperandum Teetulpa Devt. Co., N.L. .	64 14 4	20 5 6
"	Teetulpa Mining and Crushing Co.	349 11 4	—
"	Teetulpa Prospecting Syndicate	49 15 6	—
"	Teetulpa Prospecting Association	14 7 3	—
Wadnamanga	Countess of Jersey Gold Mining Co., N.L. .	321 0 0	—
Wallaroo	Yelta New Copper Mining Co., N.L.	1,000 0 0	—
Waukaranga	Alma Extended Gold Mining Co.	3,000 0 0	22 5 0
"	Kirkeek's Treasure Gold Mining Co.	691 8 1	—
"	New Ajax Consolidated Gold Mining Co., N.L.	750 0 0	—
"	Rees, R., Ajax Mine	50 0 0	—
"	New Alma and Victoria Gold Mining Co., Ltd.	3,000 0 0	3,000 0 0
Winnininnie	Winnininnie Gold & Silver Propy. Co., N.L.	86 3 6	—
Wonna	Golden Point Claims	50 0 0	—
Woodside	Bird-in-Hand Gold Mining Co., Ltd.	3,000 0 0	—
"	Eureka Gold Mining Co., Ltd.	1,500 0 0	—
"	New Era Gold Mining Co., Ltd.	1,000 0 0	—
"	Woodside Boring and Mining Syndicate	422 17 11	—
Worturpa	Backhouse, T. S.	100 0 0	—
"	Worturpa Exploration and Mining Co., Ltd.	800 0 0	—
"	Adelaide Crushing, Grinding, and Amalga- mating Mill Co.	40 0 0	—
Totals		£ 46,231 10 4	6,055 12 6

ASSAYS AT SCHOOL OF MINES.

NUMBER OF ASSAYS MADE FOR PUBLIC PURPOSES AT THE
SCHOOL OF MINES DURING THE SIX MONTHS ENDED
DECEMBER 31st, 1903.

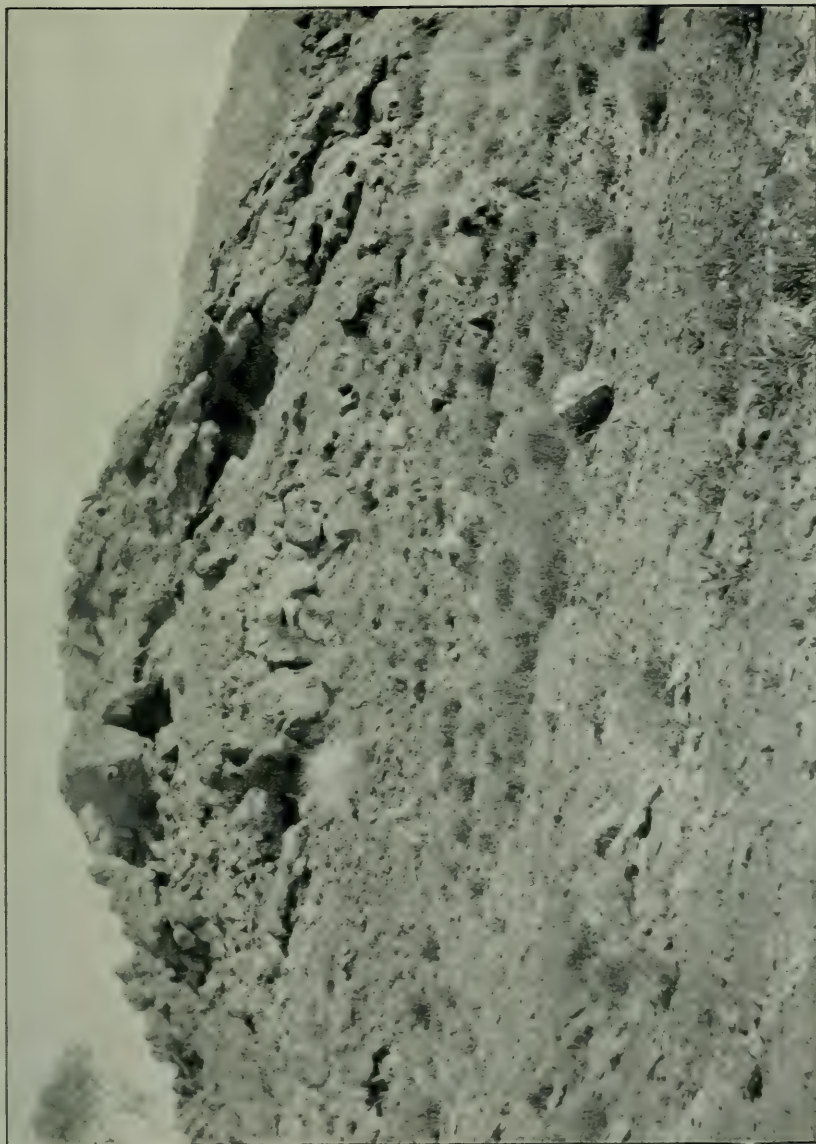
	1903.						Totals.
	July.	August.	September.	October.	November.	December.	
Assays for the Warden of Goldfields	32	104	57	31	156	174	554
Assays for the Government Geologist	—	1	93	2	59	1	156
Assays for other Govern- ment departments	—	—	—	—	—	—	—
Free public assays	150	128	144	132	52	57	663
Totals	182	233	294	165	267	232	1,373

DECENNIAL RETURN SHOWING OUTPUT AND VALUE OF VARIOUS METALS
AND MINERALS PRODUCED IN SOUTH AUSTRALIA SO FAR AS CAN BE
ASCERTAINED

Year	GOLD.		SILVER.		SILVER LEAD ORE.		COPPER.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Ounce.	£	Ounces.	£	Tons.	£	Cwts.	£
1899	3,893	15,582	—	—	—	—	109,912	406,208
1900	3,721	14,491	—	—	—	17,526	97,727	371,920
1901	4,918	16,613	—	—	1,410	11,357	131,719	468,606
1902	7,231	24,878	—	—	2,680	19,740	136,937	388,162
1903	8,650	28,650	7,086	804	211	1,267	129,812	417,116
1904	17,897	76,025	—	—	—	—	125,560	382,356
1905	10,933	43,853	—	—	—	—	130,959	426,511
1906	8,037	27,000	801	104	—	—	164,160	718,609
1907	5,609	20,540	5,845	780	1,000	11,000	158,620	690,000
1908	2,908	12,300	—	—	900	900	112,554	338,000
Totals....	—	281,935	—	1,688	—	61,790	—	4,607,488

Year.	COPPER ORE AND REGULUS.		LEAD.		IRONSTONE FLUX.		LIMESTONE FLUX.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Tons.	£	Cwts.	£	Tons.	£	Tons.	£
1899	2,892	24,682	7,282	3,782	—	—	—	—
1900	2,367	22,526	7,650	4,382	—	—	—	—
1901	1,866	23,011	1,360	722	—	—	—	—
1902	2,579	42,550	43,507	22,303	—	—	—	—
1903	7,069	54,922	14,408	8,799	84,932	46,712	—	—
1904	3,051	24,597	—	—	46,687	27,091	43,440	6,516
1905	2,563	28,434	1,040	369	84,483	48,577	44,498	4,791
1906	—	—	1,000	550	75,226	33,852	31,940	4,791
1907	—	—	—	—	84,600	38,100	31,100	5,800
1908	—	—	—	—	88,000	39,600	29,500	6,000
Totals	—	220,722	—	40,907	—	233,932	—	27,898

Year.	PHOSPHATE ROCK.		CRUDE SALT.		OTHER METALS AND MINERALS.	Total Value.
	Quantity.	Value.	Quantity.	Value.	Value.	
	Tons.	£	Tons.	£	£	£
1899	—	—	—	—	1,357	451,611
1900	—	—	—	—	411	431,259
1901	—	—	—	—	2,219	522,478
1902	—	—	—	—	742	498,375
1903	1,000	1,000	40,000	12,000	100	571,371
1904	3,000	3,000	40,000	12,000	198	531,783
1905	5,000	5,000	32,500	13,000	1,261	573,796
1906	5,850	5,850	55,000	27,500	2,219	820,465
1907	8,000	8,000	75,000	37,500	2,500	814,220
1908	11,000	11,000	75,000	37,500	4,500	457,900
Totals	—	23,850	—	139,500	15,497	5,673,258



ORE OUTCROP (YUDNAMUTANA), UNION CONSOLIDATED COPPER CO.

REPORTS FORMING ADDENDA TO THE "RECORD OF MINES."

By the Government Geologist (H. Y. L. Brown).

ADDITIONAL NOTES ON SOUTH AUSTRALIAN PHOSPHATE DEPOSITS.

(*Vide also pages 334 to 343 "Record of Mines."*)

Mannanarie, Section 154 (Williams).—Here several trenches and excavations have been made in soft clay and sandy beds, associated with travertine limestone in Cambrian and slate country, in prospecting for phosphate rock, which occurs in nodules, boulders, and masses, as usual. The largest exposure consists of a dense brown crystalline rock, resembling dolomitic limestone, samples of which were found to contain 52·3 per cent. to 67·5 per cent. tricalcic phosphate and 2·8 per cent. of iron and alumina. At other places it is white and grey in color and contains disseminated quartz grains. Analyses, 57·6 per cent. to 60·3 per cent. tricalcic, 2·4 per cent. to 2·7 per cent. oxide of iron and alumina. Quartz reefs and outcrops of cherty siliceous rocks associated with oxides of iron occur in the vicinity. The workings extend over an area of several acres and are well worthy of development.

Orroroo—Sections 3 and 25, Hundred Walloway, known as Dunn's.—Phosphate rock has been quarried here, and also disclosed by shallow pits at several points over these sections for a distance of about 1 mile. It occurs along the E. boundary of the dolomitic limestone in irregular-shaped intermittent bands of varying thickness, and segregated masses in soft earthy argillaceous and arenaceous and calcareous rock dipping at high angles W. beneath Cambrian limestone, which occupies the higher ground, and forms the hilly country extending from this place to Pekina Creek. The strike of the rocks is N.N.E., and the dip generally more or less vertical, owing to extensive denudation acting on anticlinal and synclinal folds. The phosphate "rock" deposits, so far as they have been traced downward, some 20ft. or so, appear to be roughly interstratified with the rocks in which they occur, and also partake of the nature of lode formations, particularly near the outcrops; if this is the case a system of mining instead of quarrying may have to be eventually adopted. A considerable quantity of "rock" has already been removed, and over other portions of these and adjoining sections, along the limestone boundary, additional deposits will probably be found. An average of samples taken from all the openings on sections 3 and 25 gave 56 per cent. of tricalcic phosphate.

Hundred of Pekina, Sections 21, 27, 28, 34, 42, 58, 59, and 60.—A line of lode consisting of limonite and other iron ores runs in a meridional direction through all these sections. On sections 27 and 34 the iron ore is strongly in evidence at surface, and forms low hills, in which quarries have been opened, and at one time a considerable quantity of iron ore was raised and sent to Port Pirie for fluxing purposes. At several points along the line pits have been sunk, and phosphate of alumina obtained. A sample analysed contains 26·5 per cent. of phosphoric acid, and a sample of siliceous phosphate of alumina gave 18·1 per cent., and is tinged green by phosphate of copper. A sample of the iron ore—limonite—was found to yield 4 per cent. phosphoric acid. None of these analyses disclose the presence of phosphate of lime, and phosphate of alumina has no value as a fertiliser. Samples taken from sections 21, 42, and 60 consisted of phosphate containing 13 per cent. to 18 per cent. tricalcic phosphate and 37 per cent. to 52 per cent. of insoluble matter.

Hundred Tarcowie, Section 147, known as Dodd Stacey's.—Rock phosphate occurs here similar in main characteristics to the deposit at Dunn's. The country rocks consist of foliated calcareous slates, sandstones, kaolinised slates and sandstones, limestone, and quartzite, vertical and dipping at high angles. The deposit strikes N.N.E., dips beneath blue crystalline limestone, and has the appearance of being irregularly interstratified with the country rock. Quarries and pits have been opened, from which "rock" has been raised and marketed, and prospecting in the vicinity is likely to develop more sources of supply. Samples taken gave on analysis 71.8 per cent. and 58.3 per cent. tricalcic phosphate.

Near Junction of Pekina, Tarcowie, and Black Rock Hundreds, known as Lyons'.—Only prospecting work has been done here, but shallow pits and trenches have disclosed phosphate rock in soft earthy argillaceous and arenaceous strata. Samples taken returned 63.3 per cent. tricalcic phosphate, and the place is well worth further development.

Hundred Tarcowie, Sections 185 and 216, known as Hornsdale, Swearse's Property.—Pits and trenches sunk in several places on these sections have disclosed irregular-shaped apparently interstratified beds of phosphate rock in earthy argillaceous and arenaceous country rock in Cambrian limestone country. The strata strike N. and S., and are vertical in dip. Quartz veins occur, with manganese and iron oxide in veins and coatings, associated with the phosphate rock. In a pit on section 216 the phosphate is dense, hard, and cellular; it has a width of about 8ft., and dips W. In other places it consists of narrow bands and segregations of hard rock in soft formations filling fissures in the country rock. From the character of the country rock, and the number of phosphate occurrences in them, it seems very probable that a considerable quantity of marketable phosphate exists here.

ANALYSES OF SAMPLES TAKEN.

	Tricalcic Phosphate.
1. Rock, massive, grey-colored, dense, with mammillary cavities	58.9 per cent.
2. " " yellow	47.1 "
3. " hard, cellular, brown and yellow-colored	66.1 "
4. Average samples of 1, 2, and 3	60.2 "
5. Dense, hard	56.1 "

Hundred Tarcowie, Sections 103 and 119.—On the road between these sections there is an outcrop of phosphate rock, a sample of which on analysis returned 56.5 per cent. tricalcic phosphate.

On Section 116 (Stacey's) there is an outcrop of ferruginous quartzose rock in boulders, associated with iron oxides and phosphate rock; a sample showing 31.2 per cent. tricalcic, but very little prospecting has been done on it. These occurrences are N. of Hornsdale; the rock formation is similar, and further discoveries may be anticipated in this vicinity. The strata strike N. and S., and are more or less vertical.

Sections 223 and 224, Hundred Reynolds, Martin's.—Prospecting work has been done on section 224. The country rock consists of quartzite, grit, and sandstone earthy argillaceous rocks, and crystalline limestone striking N. and S., and dipping vertically. Nodules and boulders of phosphate rock associated with ferruginous and siliceous boulders and chert have been found in the deep black soil and clay, and soft claystone and sandstone overlying the bedrock, and in small nodular outcrops on other parts of the section. No workable bodies have yet been disclosed.

On Section 223 a thin and intermittent outcrop of the "rock" occurs, apparently alternating with vertical siliceous and argillaceous strata crossing a saddle of the hills. The following analyses have been made:—Section 224, white siliceous rock, 40.8 per cent. tricalcic phosphate; brown ferruginous rock, 63.1 per cent. tricalcic; section 223, ferruginous siliceous rock, 58.7 per cent. tricalcic. On other sections lying N. and S. of these "rock" has been discovered, but so far as prospected no large payable deposits have yet been found, and the indications generally are not very favorable thereto.

St. John's, Section 1551, Hundred of Belvidere.—This locality was inspected and reported on by me in 1903, *vide* Record of Mines, page 337. Since that time a great deal of developmental work has been done, and the deposit opened out 40ft. to 50ft. deep. The quarries are entered by inclined roads, and are worked by a system of blocking out by wide galleries and pillars. The special feature of the deposit is that in addition to the usual massive segregations of rock the whole formation in certain places, where it is of a friable and apparently sandy nature, is removed bodily for the market. So far as the workings extend the phosphate-bearing material is still found to continue laterally; it still lies underfoot, and the limits in depth will doubtless be tested in the future—when the enormous overlying deposit has been exhausted. This is one of the most important localities, and should eventually be found to yield a large quantity of “rock.”

Section 295, Hundred Belvidere, known as Toms'.—The rock occurs in an unstratified clay, mud, and earthy deposit in Cambrian limestone in the usual nodules and boulders and segregated masses and veins. A large quarry has been opened on the side of a hill, and considerable quantities of “rock” extracted. On the summit of the hill, and at each side of the quarry, there are large boulders and outcrops of siliceous, calcareous, and ferruginous rock mixed with phosphate and containing iron oxides. The phosphate rock near here is more or less stained with iron and manganese, as is the case in these deposits. The phosphate is distributed throughout the clay formation, and the masses are unusually large and frequent. This locality is an important one, and is likely to yield large supplies of “rock” when further developed.

St. Kitts, Section 330, Hundred of Belvidere.—The phosphate rock occurs here in an unstratified deposit of soft micaceous clay, &c., as nodules, boulders, and veins disseminated throughout the matrix extensively. The workings consist of quarries and open cuts to depths of 40ft. or 50ft., by which the bodies of “rock” are followed. There is a very large quantity of high-grade “rock” in this deposit, and its limits have not yet been determined.

Section 357, Hundred Belvidere, Hayes and Lambert.

Section 358, Hundred Belvidere, Evans.

Sections 1265 and 38, Hundred Kapunda, Dermody's.

Operations are in progress at these places but inspections have not yet been made.

Moculta, Section 102, Hundred of Moorooro.—I reported on this discovery in 1905, *vide* page 340, Record, and since then the quarry has been considerably enlarged and the deposit followed over a large area. The phosphate-bearing material still continues in the faces, which are about 35ft. high in places. The formation or matrix is clay and earthy matter, and “rock” of high grade is still being obtained. This place has a promising future before it, and it seems likely to be one of the largest and most important yet developed. The country rock is limestone of Cambrian age.

Salter's, Section 425, Hundred of Moorooro, near Angaston.—The “rock” occurs in nodules, boulders, and segregated masses and veins in an unstratified clay, mud, and micaceous clay deposit in Cambrian limestone country. Siliceous, calcareous, and ferruginous boulder outcrops are associated together with iron ore, which at one time have been quarried for fluxing purposes. A quarry has been opened here, and phosphate rock worked to some extent. There is only a small quantity in sight at present, but additional workable bodies would probably be disclosed by further development.

Duck Ponds, Hundred of North Rhine—Linke's Phosphate Locality.—A quarry has been opened at the junction between decomposed calcareous and argillaceous strata and crystalline limestone. The phosphate rock is segregated in a clay deposit, and so far prospecting has not revealed any important bodies.

Section No. 10, Hundred of Dutton (Rice's).—The rocks here consist of blue argillaceous limestone, striking N.N.E. and dipping vertically, bounded by soft argillaceous strata, through which pass two or three rough ferruginous, calcareous,

siliceous, cherty reefs containing irregular masses of ironstone. These appear as rough boulders and masses, with which more or less phosphate rock is associated, occurring in soft argillaceous clay and decomposed argillaceous rock as segregated masses and veins, nodules, and boulders. A shaft has been sunk to a depth of about 50ft. in following down the "rock." The deposit is ill-defined and uncertain in occurrence, and no large workable bodies have yet been discovered. Iron oxide was at one time obtained here for fluxing purposes.

Hundred of Noarlunga, Section 44.—Phosphate rock associated with much manganese and iron ore has been found in hard and solid Cambrian limestone by shallow pits and trenches, but so far not in quantity.

Hundred of Noarlunga, Section 40, known as Wait's.—Phosphate rock occurs in clay and jointed broken argillaceous strata in segregated nodular masses and lode-like bedded formations in the dolomitic limestone. The deposit conforms to the N. and S. strike of the containing rocks. It has been worked by quarries, and in one place by a shaft, which has been sunk to a depth of 40ft., and a drive made on a lode-like formation, which may be, however, an interstratified bed—the phosphate rock being confined between walls several feet apart. Manganese and iron oxide as small irregular veins and stains are associated. At the bottom of this shaft and drive the phosphate still continues underfoot, and further sinking should afford valuable information as to the persistence in depth and true character of this and phosphate deposits in other localities where the occurrence is under similar conditions.

Section No. 215, Hundred of Noarlunga, near the Brighton Cement Works.—Here there is a small exposure of phosphate rock, with quartz outcropping, bounded by Cambrian limestone, which strikes N.N.W. and dips W.N.W., and is upheaved into synclinal and anticlinal form. This outcrop of "rock" extends for about 20yds. along the limestone. The area exposed is small, and the deposit is probably of limited extent. On analysis a sample of the rock was found to contain 60.7 per cent. tricalcic phosphate.

Hundred of Willunga, Section 65, known as Oliver's.—Phosphate is being rather extensively worked here. The country rock is Cambrian limestone with interstratified argillaceous, arenaceous, and calcareous beds. The workings extend N. and S., the lowest quarry being the most N. Here two bodies of phosphate, separated by a wedge or "horse" of dolomitic limestone, have been quarried out from the surface downward to a depth of about 40ft. These bodies approach one another in going down as the limestone wedge becomes narrower, and appear to unite in the bottom of the quarry, being bounded on each side by argillaceous and arenaceous beds having a vertical and sometimes contorted dip. The appearance presented is that of an irregular shattered fissure, caused by upheaval and faulting, in which argillaceous material, broken bedrock, and phosphate had been deposited. Blocks and boulders, chiefly of limestone, are also contained, and manganese and iron oxides occur as veins and coatings. At the bottom the phosphate rock is still underfoot. Going S., towards rising ground, shallow quarries have been made in clay and decomposed argillaceous and arenaceous rock, limestone and slate, mixed with phosphate, which is more widely distributed and apparently occupies hollows in the bedrock, being disseminated in nodules, veins, and segregations for a considerable width through them, and the superincumbent clay and calcareous material derived from their disintegration. The country is hilly, and its contour favorable to the opening of quarries. The surface is covered with a black loamy soil. Barytes (heavy spar) occurs on the road near section 81.

GENERAL NOTES.

Phosphate rock in small quantity has also been found in many places in the neighborhood of the localities noted, but so far these have only been prospected to a small extent. The surface indications likely to lead to the discovery of phosphate rock are rich black soil in patches associated with outcrops of Cambrian

limestone interstratified with quartzite, sandstone, argillaceous and calcareous slates, intermittent outcrops of quartz, iron ore, chert and other siliceous rocks, boulders derived from the denudation of which are strewn over the surface.

In all these quarrying operations a considerable quantity of low-grade rock and mullock is excavated and carted away in obtaining the high-grade phosphate, which alone is marketable. By screening, washing, or sluicing it is certain that the low-grade stuff could be concentrated to a considerably higher percentage. From the surface soil a large quantity of "rock" in the form of small nodules and fragments could be obtained by the same means.

In the majority of these localities siliceous, calcareous, and ferruginous outcrops, resembling lode outcrops, are surface features, and they contain and are intermixed with iron ore, manganic, and phosphatic rock to a greater or less extent. The iron and manganese oxides I take it are likely to decrease in proportion in depth. Where large bodies of phosphate are left underfoot no attempt has been made to ascertain whether they increase or die out at depth. Sinking or boring to determine this question is therefore a work which should certainly be undertaken.

Origin of these Phosphate Deposits.

A special feature in connection with many of these rock phosphate occurrences is their (apparent) bedded character, and interstratification with soft earthy argillaceous and arenaceous and calcareous beds which are interstratified with the limestones, quartzites, sandstones, and other rocks belonging to that series. This is accompanied by evidence of segregations of phosphate as bands and nodular masses in clay and argillaceous material derived from the disintegration of the soft rocks above mentioned. Quartz, as small veins, oxides of iron and manganese are associated in all localities hitherto discovered, indicating to my mind deposition by solution from phosphate-bearing rocks in a similar manner to what is supposed to occur in the formation of bodies.

A theory that may be put forward to account for the bedded character of the deposits is that during the time the Cambrian rocks were deposited the mud and other argillaceous and arenaceous beds of the then existing sea bottom were inhabited to a less or greater extent by forms of life which secreted phosphate matter and phosphate of lime, as carbonate of lime was secreted by the coral animalculæ, which are responsible for the deposition of the limestone; that in the argillaceous deposits these phosphatic animalculæ were developed in larger proportion than in the limestone, in which latter animalculæ secreting carbonate of lime were in the majority, probably because such material was more favorable to their existence. The result would be that certain strata would be charged with phosphate of lime and others with carbonate of lime, while the intervening strata would contain a small proportion of both varieties. As evidence in favor of this theory the Cambrian limestone, calcareous slates and claystones, sandstones, &c., almost invariably contain small percentages of phosphate of lime, as also do the cherts and flinty boulders found in the limestone—the limestone generally containing most. As examples, three samples of Cambrian limestone from near Reynella contained from 1.5 per cent. to 5 per cent. phosphate of lime; four samples of dolomitic limestone from Brighton contained 1.3 per cent., and three others from the same place showed a trace each; samples of claystone 1.09 per cent. and 1.52 per cent., and black chert 3.8 per cent.

In conjunction with these occurrences there is generally a large amount of clay and other argillaceous material also containing segregated phosphate, partly due to the erosion of the rocks, sometimes occupying caves and depressions, particularly in the limestone. Their formation is of still later date, and the deposit may have been enriched by the deposition of guano and other animal remains.

By the Chief Inspector of Mines (W. H. Matthews).

KITTICOOLA (*vide* page 70, Record, and page 8, Review No. 8).—Within the last 12 months active operations were restarted at this old mine by the Port Lincoln Company, and a large amount of work has been accomplished in unwatering the mine and in the erection of machinery, buildings, and other appliances necessary for the development and working of the property, all being of a permanent and substantial character. The principal underground work consists of extending drives at the various levels, developing winzes, securing ground where necessary, and other work, of which only a small proportion can be mentioned in this report.

The 180ft. Level (North).—This drive has been extended 71ft. on the line of lode, the total distance now being 298ft. from the shaft. The vein matter in the face is at present very much broken and disturbed by faults and slides, which apparently cut across the lode formation in a diagonal direction. Probably if the drive were continued until through the disturbed country the lode would then be discovered continuing its usual width. A large portion of this drive was apparently originally driven N. on a false wall or division in the lode, consequently only a portion of the lode matter on the footwall side has been taken. Recently, at various points, several openings have been made on the hanging-wall, also an enlarging of the winze from the 180ft. to the 240ft. levels. These have disclosed siliceous oxidised vein matter ranging from 3ft. to 5ft. wide, probably giving an average width of 4ft., of a very promising character. An assay from a portion of the lode 12in. wide gave a return of 18dwts. of gold per ton.

The 240ft. Level (North).—This drive has also been continued N. until the same or similar faults to those encountered at the 180ft. were met with, and the same remarks in regard to continuing the drive at the 180ft. level will apply to the 240ft. At a point 237ft. N. of the shaft a rise has exposed lode matter 6ft. wide, and at 313ft. from the shaft a second rise exposes the ore body with the same faults and disturbances that appear in the level above.

The 300ft. Level (North).—Similar openings to those in the upper levels have been made in this drive, in each instance exposing strong lode material, but containing more sulphide, the change from the oxide to the sulphide zone apparently taking place at about the 240ft. level.

The 360ft. Level (South).—A drive has been extended S. 70ft., total now being 145ft. from shaft. At this point the lode is fully 6ft. wide. A bulk sample taken gave a return of 8dwts. of gold per ton and 3·8 per cent. of copper.

Adit.—From near the foot of the hill at the most convenient point an adit, or tunnel, is being driven, and has now reached 278ft. from the entrance. This will eventually be connected with the drive at the 240ft. level, and will in many ways greatly facilitate the work.

Baker's or Main Shaft.—This is being cleaned out and timbered, the present depth being 107ft. For this purpose a set of poppet heads have been erected, winding engine installed, and the necessary pumping appliances placed in the shaft to deal with the influx of water, which is at present fairly strong.

Machinery and buildings have been erected and installed on the mine: One set of poppet heads, three multitubular boilers, two air compressors, two winding engines, with all the usual appliances, mine offices, fitting shop, smith and carpenters' shops, storerooms, assay offices, and men's changing-room, all being of the most substantial character and suitable for the various works.

General.—From my inspection of the mine I am of the opinion that the general prospects are most encouraging, and I consider that there is every probability of the mine being brought to a successful issue. Recent developments northwards have exposed a considerable quantity of oxidised ore from the 240ft. level upwards, which should be remunerative under battery treatment; but in order to thoroughly test that point I would advise taking bulk parcels of at least 20 tons of ore each from various points and sending them for treatment to the Government crushing

and cyanide works, in order to prove its actual value and determine the best mode of treatment. Then, if proved satisfactory, a small battery with the usual appliances could be erected as a testing and experimental plant, which would be a unit of the larger plant that would ultimately be installed for the general ore treatment; which, from the character of the lode matter at the deeper levels, will probably consist of a stamp mill, Wilfley tables, Frue vanners, or other concentrating appliances suitable for the ore raised from the sulphide zone, which will doubtless contain the greater values and prove the principal ore-producing portion of the mine. (19-9-08.)

MOUNT MALVERN SILVER-LEAD MINE (*vide* page 183, Record, and page 19, Review No. 8).—The main vertical shaft has been sunk to the depth of 317ft., with chambers opened out at the 215ft. and 306ft. levels, leaving 11ft. for the well. From the surface to the 312ft. level the shaft is closely timbered and centred in three compartments, two for hauling and one for pump and ladder-way. Pump bearers are placed in the shaft 50ft. apart, with ladder staging at every 15ft., which are now completed to the bottom. Runners have also been placed in the centre compartment to enable tanks and cages to be used in hauling, and all the work done, both below and on the surface, is of the most substantial character.

The 215ft. Level.—A crosscut was driven S. for a distance of 68ft. from shaft and the lode intersected. The formation at this point is 8ft. wide, showing in places on the footwall side silver-lead of good value. The drive was then continued E. on the course of the lode a distance of 110ft., and connected with the old workings. Portions of these have been retimbered and placed in good working condition, and disclose at various points high-grade material consisting chiefly of galena and steel-grey ore, giving a fair value in silver and rich in lead, which should, with proper appliances, be profitably worked.

The 306ft. Level.—The chamber at this level is 8ft. high, 11ft. long, and 8ft. wide. From the end of this a crosscut, at 36ft., encountered the lode formation and was continued on to the footwall, proving the formation to be 14ft. thick, disclosing a shoot of galena which gave a return of 23ozs. of silver and 72 per cent. of lead per ton. The total width of the lode where passed through is about 14ft., 5ft. of which on the footwall consists principally of pyrites, quartz, and ironstone, highly mineralised, and containing for milling purposes metal of a fair average value. From this point a drive made on the lode 79ft. E. has for the greater part of the distance disclosed good grade milling ore, which continues in the face the full width of the drive. At a point midway between the face of the drive and the crosscut a cut was put in across the lode during my visit, exposing strong splashes of high-grade galena throughout, giving every indication that the metal is more evenly distributed through the matrix at this level than it is in the one above. It will be necessary to continue this drive another 30ft. or 40ft., when it will be underneath the old workings, and in all probability intersect the various bodies of rich ore formerly worked above.

For future development of this property the main shaft should be sunk a further depth of at least 60ft., or 100ft. would be preferable, as it would leave a much larger extent of ground available for stoping. This, with the large quantity of milling ore from the present level upwards, would fully justify the erection of a moderate-size concentrating plant, constructed so as to admit of future enlargement as circumstances warrant.

Assays.—Five samples of ore taken from the bottom workings at various points, and one from the upper level, gave the following results:—No. 1—West drive, 306ft. level, 8.8ozs. silver, 56.9 per cent. lead. No. 2—East drive, 306ft. level, 36ft. from crosscut, 13.8ozs. silver, 74.7 per cent. lead. No. 3—East drive, 306ft. level, cut in footwall, 11.16ozs. silver, 71.8 per cent. lead. No. 4—East drive, 306ft. level, 12.4ozs. silver, 76.9 per cent. lead. No. 5—East drive, 306ft. level, borings from face 6.6ozs. silver, 31.8 per cent. lead. No. 6—Top drive, 215ft. level, 9.14ozs. silver, 66.7 per cent. lead. (9-12-08.)

By the General Assistant (L. C. E. Gee).

MUTOOROO (*vide* page 97, Record, and page 21, Review No. 8).—Operations in the N. portion are confined to hauling water at the main shaft, and continuing the process of precipitation of the copper contained therein. At present about 4 tons per month of 50 per cent. precipitate is being obtained. At the S. portion of the property three parties of tributers are working on carbonate ores.

COCKBURN COPPER MINING COMPANY (MUTOOROO WEST) (*vide* page 98, Record, and page 21, Review No. 8).—At 150ft. in the main shaft a drive is in progress to connect with the shaft 200ft. S., which was sunk in the underlie of the large sulphide lode existing here. At the time of my visit the drive was 112ft. in from the main shaft. *Vide* also page 47.

The width and extent of the sulphide ore bodies at both these mines is remarkable.

CUTANA COPPER MINE.—Situated about $1\frac{1}{2}$ miles N. of the Lux Mine and 5 miles from Cutana railway siding. This is practically a new find, although about 17 years ago a ton of 22 per cent. ore was taken from a shallow excavation on the line of lode. The present workings consist of an open cut, terminating in a shaft 20ft. deep, sunk on a well-defined lode, striking N.E. and dipping vertically. It is about 3ft. wide, and is composed of quartz, ironstone, and micaceous schist, carrying veins and bunches of copper ore, mainly grey ore and green carbonate. The walls are clean and distinct, and the lode has every appearance of persistence in depth. The country rock is granite. A general sample of the lode taken across the bottom assayed—Gold, 2dwts.; silver, 2oz. 2dwts. per ton; and copper, 10.5 per cent. A sample of the bagged ore returned—Gold, a trace; silver, 4ozs. 2dwts. per ton; and copper, 44.2 per cent. This find so far is opening up very well, and there is every prospect that it will increase in value and importance as further developed.

WINCKLER'S SILVER-LEAD SHOW (*vide* page 194, Record).—Situated about 2 miles S.W. of the Lux. About 80ft. S. from the old underlie shaft a new shaft has been sunk 45ft. deep on to a vein of galena and 3 tons of ore, worth 68 per cent. lead and 20ozs. silver per ton, marketed. Two other prospecting shafts have been put down among the old workings, and 4 tons of ore obtained yielded from 50 per cent. to 70 per cent. lead and from 15ozs. to 20ozs. silver per ton. In the early days some very rich and large slugs of silver-lead ore were found here. Since then the place has only been worked intermittently, but generally with good results.

QUEEN BEE (*vide* page 123, Record, and page 20, Review No. 8).—The winze from the 100ft. level is now down 64ft., and the lode is 4ft. 9in. thick, carrying 18in. of good ore. Of 6 tons treated 3 tons returned 20 per cent. and 3 tons $9\frac{3}{4}$ per cent. copper, and the ore contained a certain amount of gold. This is a well known and good mine, but pumping machinery is required in order to work at the lower levels, where the lode, tested to 270ft., continues from 3ft. to 4ft. wide, carrying copper and gold.

THE LUX (*vide* page 237, Record).—Some prospecting work is in progress near the old main shaft in an underlie shaft on the Bismarck reef, following down a quartz and gossan leader 15in. thick. About 18 months ago 20 tons of ore from this shaft returned 8dwts. to 9dwts. of gold per ton, and 1 ton gave $19\frac{1}{2}$ per cent. copper and 7dwts. gold.

COOKE'S COBALT MINE (*vide* page 353, Record).—About 10 miles N. of Bimbowrie Station. Three shafts, 90ft., 50ft., and 30ft. in depth respectively, have been sunk, and also a number of shallow prospecting shafts and open cuts. No work is in progress at present. Erythrite (cobalt bloom) is to be seen in the spoil heaps. Rich ore has been found in the past, and a company to develop the mine is in course of formation.

Chiastolite.—Chiastolite crystals occur in the vicinity of the Cobalt Mine, weathered out of the micaceous schist rock. They are found in pieces up to 7in. in length, and 2in. in thickness. The transverse section shows a cross in some form throughout, and when polished has an effective and gemlike appearance. A



CARNOTITE SHAFT. NORTH-EAST.



MUTOOROO MINE. NORTH-EAST.



KING'S BLUFF SHAFT, NORTH-EAST.

new variety, in which the crystal is oblong in shape, and the sections show markings like a fern leaf, was discovered here, and has been named "Howdenite," after the finder, Mr. G. R. Howden.

BIMBA HILL (also known as MOUNT HOWDEN and RANGOON) (*vide* page 29, Record).—Among some low hills, a formation consisting of ironstone, quartz, gossan, &c., with bunches and veins of copper ore. Strikes N.E., and has been tested by nine shafts and numerous open cuts and prospecting holes over a length of about half a mile. It varies in width, which would probably average about 40ft., and may be regarded as a contact lode or bed between white hornblende rock on the S. side and schist on the N. The deepest shaft is situated near the S.W. end; the bottom, 228ft., is in white iron pyrites. The place has been worked at intervals for about 20 years, and I was informed that from first to last about £12,000 worth of copper had been marketed. The ore sent away was hand-dressed up to 20 per cent. The present holder is working on a body of green carbonate, disclosed by a shallow shaft, and there are doubtless large untouched deposits of copper ore remaining.

THE MARY MINE (*vide* page 79, Record).—Worked recently by the Benowrie Copper Company, the following work having been done:—Vertical shaft sunk at the W. end of the old workings to a depth of 105ft. A sulphide vein, 18in. thick, and assaying well for copper, was cut at 65ft. Another small one was cut at 75ft., and was driven in S. for 20ft., where it opened to 2ft. 6in., and assayed 13½ per cent. copper. At the bottom drive N. 15ft. and S. 40ft., thence E. 10ft. An existing underlie shaft 152ft. E. of the vertical shaft, was continued on a bearing of W. 30° N., to a depth of 92ft., on the underlie of 41°. From this a drive was made at 65ft., about N.W. through lode matter, carrying copper sulphide ore for 30ft. The sulphide then dipped out of the drive, which ended on a foot-wide seam of green carbonate. The company ceased operations, and wound up, owing to the unsatisfactory state of the copper market. The ground was then taken up by present holders, who, at 25ft. along the drive, started a winze, and at once got into a large body of dark sulphide and black ore, the size and extent of which cannot yet be determined, but the find appears to be of considerable importance, and the future prospects of the mine are much enhanced by it.

The following parcels have already been marketed:—Five and a half tons, 8 per cent.; 3 tons, 10 per cent. sulphide ore; 3½ tons, 27·2 per cent. black ore from bottom of winze, further supplies of which were being raised at the time of my visit. A general sample taken by me across the bottom of the winze assayed:—Gold, 2dwts. 1gr.; silver, 1oz. 4dwts. per ton; copper, 32·4 per cent. A sample of quartz and copper pyrites from the winze gave:—Gold, 2dwts.; silver, 10dwts. per ton; copper, 13·1 per cent. A sample from the sulphide vein in the vertical shaft returned:—Gold, 4dwts.; silver, 14dwts. per ton; copper, 16·7 per cent.

KING'S BLUFF (*vide* page 223, Record, and page 21, Review No. 8).—In the main underlie shaft water was struck at 500ft.; the shaft was continued to 555ft., and the supply is now estimated at 12,000galls. per hour. The shaft is to be fitted with an electric pump, and until this has been done other operations are suspended. A new 25 horse-power boiler has been fixed for the battery, &c., and 16 tons of stone crushed recently yielded 18½ozs. of gold.

NIL DESPERANDUM (MEYER'S CLAIM).—Situated about 15 miles S. of Olary and 2 miles from Maldigo Well. A lode, carrying copper ore, mainly blue and green carbonates and grey ore, strikes N. and S., dips 65° W., through close-grained sandstone rock, which strikes N. and S., and dips 70° E. It appears to be about 18in. thick, but the hanging-wall is not well defined. The main working is an open cut, about 20ft. deep in the deepest part, and 60ft. along the surface. By means of costeans and small open cuts the lode has been proved along the surface for about 5 chains. Fifteen tons hand-dressed and marketed returned 34 per cent. to 37 per cent., and a sample taken by me across the bottom, 20ft. from surface, assayed:—Gold, 3dwts. 1gr.; silver, 1oz. 14dwts. per ton; copper, 8 per cent. A parallel

lode formation shows on the surface a short distance to the W. This may be regarded as an excellent prospecting show, with every prospect of satisfactory development in depth.

RIDDLE'S CLAIM.—About $\frac{1}{2}$ a mile S.E. from the Nil Desperandum. A narrow vein of ore running through hard blue siliceous slate has been worked by open cuts over a length of 4 chains, and to a depth in one place of nearly 40ft. The ore consists of malachite, azurite, and ironstone, and there seem to have been some rich patches. No work is in progress at present, but 13 tons of ore from the place averaged 13 per cent. A sample from the dressing floor assayed—Gold, 1dwt.; silver, 27ozs. per ton; copper, 33 per cent.

On a hill about 1 mile N. of Meyer's Claim some irregular veins of copper ore in very hard country have been prospected, but nothing definite found so far. About 1 ton of ore was sent away for treatment, and gave 17 per cent. copper, 23ozs. silver, and 3dwts. gold. A sample taken by me assayed—Gold, 9dwts.; silver, 17dwts.; copper, 3-6 per cent.; arsenic, 0-3 per cent.; bismuth, 4-5 per cent. There are other small prospecting shows in the vicinity, and the whole neighborhood is well worthy of careful and systematic prospecting.

MOUNT GRAINGER (*vide* page 250, Record, and page 27, Review No. 8).—A new winding plant has been lately installed at the main shaft, and is in good going order. A contract is in progress for deepening the main shaft 80ft. from the previous bottom, 245ft. This is for the purpose of obtaining an adequate supply of water for treating the large bodies of auriferous material already exposed in the workings.

THE MEDORA is held by the present proprietors in conjunction with the Mount Grainger, and should the present operations result in striking an abundant supply of water, as is confidently expected by those interested, a thorough mineral awakening of this important district may be looked for.

On the N. end of the Grainger lease two men, who have been prospecting the locality for some time, have opened up some rich auriferous veins in a ferruginous formation, composed of loose-jointed clayslate, quartz, gossan, and ironstone. Some nice coarse gold has been obtained by washing. A parcel of 5 tons or 6 tons is to be treated shortly at the Petersburg Government Cyanide Works, and, judging from the prospect I saw panned off, the result should be satisfactory. Memo.—The parcel of 7 tons yielded 39ozs. 16dwts. gold.

Asbestos.—On one of the old Oodlawirra flux leases shallow workings in and near the bed of a creek have disclosed in soft ground bodies of asbestos of the mountain leather and mountain cork varieties. It also occurs in seams of the rock near by. Very little work has been done, and no opinion can be formed as to whether the deposit is small or great. Recently some inquiry has been made regarding this kind of asbestos in connection with its use in the manufacture of fireproof tiles.

OCBRE, NEAR OODLAWIRRA (*vide* page 29, Review No. 8).—A large formation here, close to the railway, shows extensive deposits of ochre, giving, on treatment, a fine red paint basis. No work is in progress at present. (13-11-08.)

By the Inspector of Mines (H. Jones).

TOWER HILL. (*vide* page 137, Record).—About 13 miles E. from Lyndhurst Siding. Three lodes traverse the property, striking nearly N. and S. and dipping E. at 45°. Principal workings are confined to the W. lode, on which two shafts have been sunk, partly vertical and partly underlie, to 72ft. and 83ft. respectively. The lode is from 6in. to 12in. wide, and is composed of calcite impregnated with green carbonate, grey, and yellow ore of high percentage. From the 60ft. level in the 83ft. shaft a drive S. has been made for 50ft. and the ore stoped up nearly to the surface, and from the bottom of the 72ft. shaft a drive S. extends for 50ft., and the ore stoped out to the surface. The ore from both of these stopes was mostly high grade, returning from 28 per cent. to 32 per cent. copper.

In both ends of the workings the lode is about its average width, but is poor in quality; this change in value, however, should not be regarded as likely to be permanent—it is not an unusual occurrence in all lodes—and the probabilities are that when driving N. and S. is resumed further rich shoots of ore will be cut.

The lode near the bottom of both shafts is cut off on a floor which dips N. 1 in 7; the bottom of one of the shafts is 3ft. through the floor, and, judging from the country below the break, the throw seems to be an E. one. In order to prove this, and test the lode below the fault, the shaft must be sunk deeper into the solid and settled country, and crosscuts made. Throughout the workings the lode formation is fairly well defined; its course is at right angles to the bedding of the country rock, and, this being a fissure lode, it may reasonably be expected to be persistent in depth. Owing to the small amount of work done on the other two lodes no opinion can as yet be expressed on them. (24-6-08.)

DOUGLAS' CLAIM.—Situated 1 mile from Avondale Mine. An open cut 10ft. long and 7ft. deep has been made on a galena lode formation 4ft. wide, which consists of calcareous slate, with small veins of galena $\frac{1}{2}$ in. thick and 6in. apart. At the S. end of the open cut a shaft has been sunk to a depth of 30ft., the formation being of the same low grade as in the open cut. (25-6-08.)

CLAIM NEAR THE AVONDALE.—The Tower Hill Company sunk a shaft to a depth of 50ft. on a galena formation, but nothing of a payable nature was discovered. (25-6-08.)

LITTLE WONDER (East of the Avondale).—A shaft has been sunk to a depth of 35ft. At the 25ft. level a drive was made 20ft. on the course of the lode, which strikes N. and S., dips W., and is from 6in. to 12in. wide, of calcite and slate, with green carbonate, red oxide, and patches of yellow ore. Some of the ore, it is stated, assayed up to 28 per cent. copper. This lode is well defined, and the outcrop can be traced for over a quarter of a mile. (25-6-08.)

WILD DOG MINE.—Situated 3 miles S.E. from Leigh Creek. Two lodes, about 20ft. apart, traverse this property, striking N.E. and S.W., dip S.E. The workings consist of shallow shafts and open cuts on both lodes, extending for 200ft. along the line of strike, from which a great quantity of high-grade ore has been extracted. The S.E. lode is from 5ft. to 6ft. wide, and consists of quartzite and slate, with veins of green carbonate and grey ore from $\frac{1}{2}$ in. to 2in. thick, some of them parallel with the formation and others crossing it, and in places penetrating the country rock on each side for some distance. The W. lode is from 3ft. to 4ft. wide, and consists of clayslates, with seams of grey ore and green carbonate of high grade. Some of the ore sent away hand-dressed up to 40 per cent. Deeper sinking is recommended. (25-6-08.)

MATHESON'S (*vide* page 79, Record).—Driving S. is in progress here at the 70ft. level, on lode formation which is 6ft. wide, and consists of decomposed slate and sandstone, with small seams and nodules of blue and green carbonates and veins of grey ore throughout, yielding, after little dressing, from 20 per cent. to 25 per cent. copper. (25-6-08.)

AVONDALE SILVER AND LEAD MINE (*vide* page 164, Record).—Situated 15 miles from Lyndhurst Railway Station. On the E. lode, 60ft. N. of the main shaft, a shaft has been sunk to a depth of 20ft., and at the bottom a drive put in on the course of the lode for 36ft., where it connects with No. 3 shaft. The lode operated on is 2ft. wide, and consists of ironstone, gossan, and slate, with small seams of galena. The country rock is quartzite and slate. Six tons of ore recently sent away gave a return of 72 per cent. lead and 6ozs. silver per ton. (25-6-08.)

BLUE MOUNT.—Situated 2 miles from Leigh Creek, adjoining the Tasmanian Copper Company, and about a quarter of a mile from the smelting works. A wide belt of ore-bearing material traverses the property, strike E. and W., dip S., on which five shafts have been sunk to depths of from 30ft. to 40ft. Water-level, 30ft. The formation, which is not well defined on the surface, as proved in the shafts and open cuts, is from 30ft. to 40ft. wide, and consists of decomposed sandstone and slates, with veins and nodules of blue and green carbonates and grey ore all through.

It is well worthy of further testing at greater depth. The ore is hand-dressed up to 25 per cent. copper. There are strong indications of two other lodes on the property, on which a little shallow working has been done. These look promising, and should be developed to further depth. (25-6-08.)

RED OXIDE (*vide* page 125, Record).—Situated 3 miles S.W. from Mount Lyndhurst. A large ironstone lode formation outcrops on the property, striking N. and S. and dipping W. It is exposed in an open cut 18ft. long and 10ft. wide; the ore-bearing portion is from 6ft. to 10ft. wide, and consists of quartz, ironstone, and calcite, with green carbonates, grey ore, and red oxide throughout. A shaft has been sunk from the open cut on the underlie in the footwall portion of the lode, it was stated, to a depth of 60ft., but no work has so far been done at that level to develop and test the value of the ore body. (25-6-08.)

WHITE LEAD (*vide* page 151, Record).—Situated 3 miles S.W. of Mount Lyndhurst. Some well-defined ore-bearing material has been disclosed by open trenches and shallow pits, bearing E. and W., dipping S. The formation, which can be traced on the surface for nearly a mile, consists of soft slate and sandstone, with small veins of green carbonate and grey ore. Judging from the amount of work done a great quantity of payable ore must have been obtained. The surface indications of this extensive lode are exceedingly favorable, and will fully justify its development at greater depth. (25-6-08.)

LAST CHANCE.—Two miles S.W. of Mount Lyndhurst. There are two lodes traversing these leases, bearing E. and W., dipping S. A considerable amount of work has been done on the N. lode from an open cut 60ft. long by 15ft. wide, disclosing for the whole width ore-bearing material consisting of decomposed slate, ironstone, and kaolin, impregnated with green carbonate. About 76ft. W. of the open cut a costean has been cut across the line of lode for a length of 123ft. and 3ft. to 4ft. deep, with the intention, probably, of picking up the continuation of the ore in that direction, but nothing of value was discovered; 300ft. further W. a vertical shaft has been sunk to a depth of 50ft. At the 30ft. level there is a drive 70ft. E. in brown iron ore formation, stained with green carbonates, and at the 50ft. level a drive W. 60ft.; in both levels the ore pinched out to 2in. or 3in. thick. The S. lode is well defined, and is a continuation of the White Lead lode. Two shafts have been sunk, about 6 chains apart, one 30ft. and the other 40ft., and in both the lode is from 3ft. to 4ft. wide, of soft slate and kaolin, with small seams of green carbonates in all the joints and cleavages. This lode has been proved for a distance of over 2 miles along the line, could be cheaply worked, and, with smelting plant at a reasonable distance, should pay well. (25-6-08.)

BELLIAC.—Situated 1 mile S.W. of Mount Lyndhurst. The last work done on this property was carried on by the Lynda Company from a shaft 150ft. deep. A considerable amount of driving and stoping has been done on the course of the lode E. and W. of the shaft, and a great quantity of ore extracted, some of which, after dressing, yielded 20 per cent. copper. (25-6-08.)

LEASES ADJOINING MOUNT LYNDHURST MINE WESTWARD.—A considerable amount of work has been carried on by means of trenches and shallow pits over a length of 300ft. and 200ft. wide, exposing low-grade lode material, bearing N.E. and S.W., and consisting of slate and kaolin, with small seams and stains of green carbonates. Four shafts have been sunk along the line of lode at different points to depths of from 30ft. to 40ft., disclosing ore-bearing material of the same character as in the shallow workings. To further develop this large deposit it would be best to continue one of these shafts to a depth of 100ft. and crosscut through the formation at that level to test its value. (25-6-08.)

GREAT MOUNT LYNDHURST (*vide* page 58, Record).—The principal workings are situated on the top of a hill 100ft. above the plain, and consist of about 12 shafts, sunk to depths of from 30ft. to 70ft. on the different lodes that traverse the hill, bearing E. and W., and from 20ft. to 30ft. apart. From what can be seen in the old workings the shoots of ore appear to have been fairly wide in places, but were rather short along the line of strike. Judging from the amount of work done great

quantities of high-grade ore must have been extracted. A tunnel has been put into the hill from near its base for a distance of 320ft., which has been connected with one of the shafts, but nothing of value was met with in the tunnel. (25-6-08.)

LYNDA (*vide* page 77, Record).—The principal work done on this property consists of four large open cuts, 30ft. wide, and from 10ft. to 15ft. deep. The ore-bearing material exposed in them is from 50ft. to 60ft. wide, striking E. and W., dipping N., and composed of clayslate and sandstone, with numerous seams and veins of green carbonate, grey ore, and red oxide in the bedding of the strata. The mine is equipped with a concentrating plant, and, judging from the amount of work done and the size of the tailings heap, a great quantity of ore must have been extracted and treated, but no work was in progress at the time of my visit. (26-6-08.)

LESLIE'S WELL, ONE MILE S. OF.—The main workings are situated on a comparatively level plain, and consist of a great number of shallow pits and trenches along the line of lode for a length of 600ft. by 60ft. wide, and to a depth of from 6ft. to 10ft. Ore-bearing material is exposed in all. Striking E. and W. and dipping N., it consists of slate and kaolin, with seams of green carbonate, grey ore, and red oxide. About 50 tons of ore have been treated from this place, 10 tons of which gave 8.4 per cent. copper, 34 tons 10 per cent., and 1 ton 23 per cent. The various dumps contain a large quantity of seconds, estimated to average from 4 per cent. to 5 per cent. This large formation looks exceedingly promising, and warrants being tested to greater depth, where it will probably be found more compact and richer. (26-6-08.)

BENALACK'S (*vide* page 28, Record).—Three well-defined parallel lodes traverse the property, and striking S.E. and N.W., dipping N.E., from 35ft. to 40ft. apart, and their outcrops can be traced for over $\frac{1}{2}$ a mile. Four shafts have been sunk on the middle lode to depths of from 20ft. to 90ft. Work is carried on at present in No. 3 shaft at 60ft. level, where drives have been put in N.W. 27ft. and S.E. 40ft. on the course of the lode, which consists of calcite and ironstone, green carbonate, grey ore, red oxide, and yellow sulphide of high grade, yielding after a little dressing from 30 per cent. to 35 per cent. copper. Four tons of ore bagged on surface average 30 per cent. On the N.E. lode a shaft has been sunk to a depth of 28ft., and the formation is from 9in. to 12in. thick, of calcite, with grey ore, red oxide, and seams of sulphide. A considerable amount of prospecting has been done on other parts of the leases, disclosing the same quality of copper ore. There are favorable indications, both through the workings and on the surface, that the lodes traversing this property will continue down to great depths. (26-6-08.)

MOUNT BURR (*vide* page 86, Record).—The principal workings are situated on a hill, about 70ft. or 80ft. above the bed of the creek, and consist of shallow sinking and open-cut workings. Judging from the amount of work done on the hill—for 400ft. long and 250ft. wide, and 12ft. to 15ft. deep—a fair quantity of ore must have been extracted at different times; but owing to the way the work was carried out—opening the new place and filling the old one—it is impossible to examine the whole of the ore-bearing veins. The formation appears to be very wide, with small veins of copper ore a short distance apart running N. and S. through it all. Judging from what could be seen all through the old workings, and considering the size of the ore-bearing material, further development, by shaft sinking, to prove its value at depth is fully warranted. There are two men working on the property in an open cut about 8ft. or 9ft. deep on veins from 1in. to 3in. thick, of green carbonate and grey ore. They have from 4 tons to 5 tons on the surface, dressed up to about 17 per cent. (27-6-08.)

MONT PEELEE.—Situated $2\frac{1}{2}$ miles E. of Nicholl's Nob. On a large ironstone outcrop 4 chains in length a considerable amount of work has been done in the way of open cuts and trenches. No. 1 open cut, at the foot of the hill, is 40ft. long by 20ft. wide, exposing lode material, striking N. and S., dipping W., and consisting of quartz and ironstone impregnated with green carbonate, red oxide, and grey ore for a width of 10ft. Two chains further up the hill, in No. 2 open cut, the lode appears

to be branching into two formations, one keeping N. and the other taking a N.W. course. For a distance of 60ft. past the junction there are shallow workings on both lodes, disclosing ore-bearing material 5ft. wide. It was stated that the ore sent away yielded from 6 per cent. to 10 per cent. copper. (27-6-08.)

PAULL'S NORTH (*vide* page 118, Record).—Situated 3 miles N.W. from Paull's Consolidated. Work was originally carried on at a tunnel, which has been put into the hill on the course of the lode for a distance of 75ft. The formation disclosed strikes N.W., dips N.E., and is from 12ft. to 15ft. wide, of quartz and kaolinised material, with three veins of grey ore and copper glance of from 2in. to 3in. thick, one on each wall and one in the centre, with green carbonate throughout the matrix between. The veins are rich, and can be easily dressed up to 30 per cent. About 200ft. N.E. of the tunnel a well-timbered shaft, 6ft. by 4ft. in the clear, was sunk by a previous company to a depth of 60ft. The present holders have decided to continue this down a further depth of 15ft. to intersect the lode, from which such good results were obtained in the old workings. (29-6-08.)

BROKEN RANGE.—Six miles N.W. from Paull's Consolidated. A great number of well-defined ferruginous quartz lodes, from 12in. to 15in. thick, and from 20ft. to 30ft. apart, traverse this property, striking N. and S. There is also a large copper-bearing formation running E. and W., and where the N. and S. lodes intersect it some high-grade ore has been met with. The principal workings consist of scores of shallow pits, from 6ft. to 10ft. deep, over an area of 600ft. by 200ft., and in nearly all the ore-bearing material is clayslate and ferruginous quartz, with green carbonate, grey ore, copper glance, and ruby oxide. A little malleable copper and gold have been met with near the junction of the various lodes. Twenty tons of ore have been treated, giving a return of from 30 per cent. to 35 per cent., the last $3\frac{1}{2}$ tons returning 28 per cent. copper. To further develop the various lodes on the property, a fair-sized vertical shaft should be sunk 1 chain S. of the E. and W. formation, from which several of the N. and S. lodes could be intersected near the junction by short crosscuts. (29-6-08.)

PHIL MA COOL.—Five miles W. from Burr Well. The lode formation traversing this property is small and not very well defined. Strike N. and S., dip E. Three shafts, 30ft. apart, have been sunk to depths of from 18ft. to 60ft., in soft, decomposed slate and sandstone. The vein operated on is from 1in. to 3in. thick, and has been stoped out along the line from the bottom of the shafts to the surface. (30-6-08.)

SOUTH CREEK (*vide* page 131, Record).—A considerable amount of work has been done on different parts of the property, and, judging from the spoil heaps and what can be seen in the old workings, a great quantity of payable ore must have been obtained; but there are no evidences anywhere of the lodes having been explored to a reasonable depth. The most recent workings are 5 chains N. of Gum Well, and they consist of four shafts, sunk to depths—judging from the dumps—of from 30ft. to 75ft. Water-level, 20ft. from the surface. The formation is from 2ft. to 3ft. wide of calcite and gossan, with veins of carbonate and grey ore 2in. to 3in. thick. Strike E. and W., dip S. A considerable amount of stoping has been done from the shafts both ways along the line of lode. (30-6-08.)

PAULL'S CONSOLIDATED (*vide* page 116, Record).—The property is traversed by a well-defined lode, which has been proved in shafts and open cuts for over a mile in length. The main working shaft is down on the underlie to a depth of 330ft. At the 300ft. level a plat has been made and a drive carried E. on the course of the lode for a distance of 280ft. The lode for the whole distance is well defined, and is from 3ft. to 4ft. wide, of ferruginous material, carrying rich veins of grey ore, red oxide, and green carbonate throughout. A considerable amount of stoping has been done along the drive to a height of from 20ft. to 40ft.; in one place through to the 250ft. level; and in a few shallow holes sunk below the drive some high-grade sulphide ore was met with. Most of the work carried on at present is driving W. and stoping E. at the 250ft. level. The ore-bearing material here is from 10ft. to 15ft. wide, with seams and veins of steel grey, red oxide, carbonates, and ribbon

ore through the whole, which is easily hand-dressed up to 28 and 30 per cent. copper. The main shaft has been connected by drives with No. 2 shaft, making the ventilation good. The concentrating plant on the mine is not being utilised, as the present holders prefer to hand-dress the ore. Four tons a week of 28 per cent. ore are sent away. (1-7-08.)

MINERAL CLAIM 1 MILE S.E. OF RED BLUFF.—A lode formation traverses this property, striking N. and S., dipping W. A vertical shaft 6ft. by 4ft., on the outcrop, has been sunk to a depth of 60ft. The ore taken out of the shaft down to the 40ft. level was rich in copper, and paid for the sinking, but from there down the lode is W. of the shaft. At the 60ft. level a W. crosscut has been put in, and the ore body intersected at 5ft.; it is from 2ft. to 3ft. wide, of gritty quartz and kaolin, with veins of grey ore and green carbonates. A start was made to drive both N. and S. on the course of the lode, which looks very encouraging. (9-7-08.)

MINERAL CLAIM 2 MILES W. OF YUDNAMUTANA.—A shaft has been sunk on the side of the hill to a depth of 20ft. on a small vein of copper ore 6in. thick, in soft decomposed slate. Six tons of ore were extracted, which gave an average of 17 per cent. copper. Further up the hill, in an open cut 15ft. long and 10ft. wide, ore-bearing material is disclosed, consisting of sandstone and slate, strongly stained with green carbonates. Prospecting work has been done by shallow pits and trenches on other parts of the property, but nothing defined and payable was discovered. (9-7-08.)

BLUE MINE.—Situated about 4 miles S.W. from Yudnamutana. Near the top of a range 350ft. high a considerable amount of work has been done in an open cut 40ft. long and 20ft. wide and 30ft. high in the face, disclosing a large formation, striking N.E. and dipping N.W., and consisting of ferruginous quartz, quartzite, and slates, with green carbonates, grey ore, and azurite through the matrix for a width of 15ft. Forty tons of ore, averaging 18 per cent. copper have been marketed from these workings; they were sent down from the top of the hill to the plain below on an aerial ropeway. On the W. side of the hill a shaft has been sunk to a depth of 35ft., on a lode striking N. and S., dipping W., and from 4ft. to 5ft. wide, of decomposed material, with blue and green carbonates. (9-7-08.)

MOUNT MACDONNELL (*vide* page 94, Record).—Six miles N.E. of Yudnamutana. The work has been carried on recently here close to the bank of the creek, and consists of an underlie shaft sunk to a depth of 40ft., and at that level drives have been made E. and W. on the course of the lode, 20ft. each way. The ore body is 2ft. 6in. wide, of quartz, calcite, and micaceous iron, impregnated with yellow and peacock ore of high percentage; 14 tons sent away gave an average of 17 per cent. copper, and 3½ tons by the tributers 28 per cent. About 60 chains from the above are the *Ingliston* workings, situated on the side of a range 300ft. high, and consisting of two open cuts 10ft. long by 10ft. wide each, and in these are disclosed ore-bearing material from 10ft. to 15ft. wide, with blue and green carbonates and small seams of grey ore through the matrix. This ore in bulk will go from 4 per cent. to 5 per cent., and could be dressed with little trouble to a much higher percentage.

DOMINICK (*vide* page 126, Record).—Situated near the top of a range 400ft. high. About 250ft. up the hill a tunnel was put in some years ago to a distance of 300ft., and 100ft. in from the mouth of this tunnel the Tasmanian Copper Company put in a drive W. for a distance of 50ft. At that point a connection was made with a winze sunk from the higher workings, which has been used since for a pass. In the workings above the tunnel a considerable amount of driving and stoping has been carried on E. and W. for 50ft. The formation is 30ft. wide of kaolinised material, with seams and nodules of grey ore, azurite, and carbonates. After the company ceased work the tributers sent away 90 tons of 28 per cent. ore. The prospects of the large ore bodies on this property are highly favorable, and warrant further developing. (10-7-08.)

WILLIGUN (*vide* page 151, Record).—Eight miles E. of Yudnamutana. Two prospecting shafts have been sunk on the property on separate bodies, striking N. and S. and dipping W. No. 1 shaft on the E. lode is 35ft. deep, and the forma-

tion is from 2ft. to 3ft. wide, of kaolinised material, with blue and green carbonates and grey ore. It was stated that 10 tons of 24 per cent. ore had been taken from here. No. 2 shaft appears to be 25ft. deep, sunk on an iron formation 18in. thick, slightly stained by carbonates. (10-7-08.)

SHAMROCK.—Adjoining the Willigun. No. 1 shaft has been sunk on the underlie to a depth of 80ft. At the 30ft. level a drive on the lode E. and W. shows the formation to be 2ft. 6in. wide, composed of clayslate and iron, with grey ore, carbonates, and a little yellow sulphide. Some rich pockets of ore were found in these workings by the prospectors, giving an average of 28 per cent. copper. No. 2 shaft has been sunk vertically to a depth of 35ft., in diorite country rock, but nothing of value was met with. (10-7-08.)

GRAND JUNCTION.—Situated $2\frac{1}{2}$ miles E. of Daly Bluff. A well-defined lode traverses this property, strike N.W., dip S.W., on which a shaft has been sunk to a depth of 130ft. This formation is from 2ft. to 6ft. wide, consisting of slate, a little quartz and copper pyrites, black oxide, and micaceous iron. Near the foot of the hill a tunnel has been driven for a distance of 50ft., where the lode was intersected, and a winze has been sunk on it to a depth of 80ft. The lode is going down strongly, carrying high-value sulphide ore, and it appears likely to continue down to a considerable depth. (10-7-08.)

UNION CONSOLIDATED (YUDNAMUTANA) (*vide* page 157, Record).—The holdings consist of 12 leases of 40 acres each. The management having decided to erect a smelting plant, a suitable site has been selected where additions can be made to the plant when necessary, and a good supply of water obtained. There is a well-defined lode traversing the *Yuda* leases, traceable on the surface for a distance of 1 mile, striking nearly N. and S. A considerable amount of work has been done on it, and from an open cut 85ft. long and 15ft. to 20ft. wide a great quantity of high-grade ore has been taken out, yielding 25 per cent. to 40 per cent. copper. Several shafts have been sunk along the line to depths of from 60ft. to 120ft., and in all of these the lode was going down strongly. At 150ft. S. from the foot of the hill a shaft 12ft. by 4ft. in the clear has been sunk to a depth of 100ft., or 40ft. below water-level. This shaft is well situated to enable the lode to be worked, and should be sunk deeper, and drives put in N. and S. on the course of the lode.

One mile N. from these workings a shaft has been sunk to a depth of 120ft. on the *Gleeson* (*vide* page 149, Record), from which high-grade ore was obtained, mostly sulphide, yielding 30 per cent. copper. This lode looks promising, and is likely to go down to a great depth.

No. 2, or Pinnacles (*vide* page 118, Record).—The principal work on this lease is a tunnel driven into the hill for 133ft., on the course of a large sulphide lode, striking E. and W., dipping S. It consists of calcite, iron pyrites, green carbonate, and yellow ore. Twenty-five tons of undressed ore from here gave a return of 8 per cent. copper. As the tunnel is extended under the hill there will be about 100ft. of backs on which to operate, and some thousands of tons of ore can be extracted at little cost. There are other lodes here on which a few shallow holes have been sunk, and in each of these good grade sulphide ore has been obtained. S. of the above lease and adjoining it is No. 2A, where a shaft has been sunk on a big lode formation to a depth of 60ft., and 100ft. of driving has been done at that level on the course of the lode, striking N. and S. and dipping W. Further up the hill an open cut has been made, exposing lode material from 40ft. to 50ft. wide, and consisting of quartzite and iron, with copper ore intermixed. The ore sent away from here gave a return of 14 per cent. A great quantity of ore can be extracted from this lode by the open cut system.

Wheal Frost (*vide* page 148, Record).—There is a large body of ore-bearing material traversing these leases, and it can be traced on top of the range, which is from 300ft. to 400ft. high, for a distance of half a mile. Work has been carried on from the open cuts near the top, exposing ore material for a width of 50ft., striking N.W., dipping N.E., and consisting of quartzite and micaceous iron and pyrites, with green carbonate and patches of yellow ore; 10 tons treated yielded 19 per cent.

copper and 4dwts. of gold per ton. A tunnel is in progress from the side of the hill, and has been driven a distance of 324ft. The lode formation should be intersected soon, and this will give 300ft. of backs to operate on.

Old Noll's (*vide* page 107, Record).—The principal workings are situated near the hilltop, 600ft. or 700ft. above the creek. A great quantity of ore has been extracted by open cuts, and was sent down to the bottom of the hill on an aerial ropeway. The ore-bearing material is quartzite, quartz, and ironstone, carrying green carbonate, copper glance, and grey ore, and it appears to be from 50ft. to 60ft. wide, striking N. and S., dipping W.; 50 tons treated without dressing gave a return of 7.5 per cent. copper; dressed ore sent away by the tributers gave a return of 44 per cent. This looks a promising formation, from which some thousands of tons of ore can be extracted cheaply.

LYNDHURST, SOUTH AUSTRALIA, COPPER CO. (*Daly Mine*, *vide* page 48, Record).—Work is carried on here by means of tunnels and open cuts. The ore-bearing formation is running through a hill 300ft. high, and the outcrop can be traced following the top of the hill for fully $\frac{3}{4}$ of a mile, striking N. and S. Work is carried on from two open cuts 450ft. long each, and 300ft. apart. These have been started half-way up the hill on the W. side, and are cutting across the formation at right angles, and will have, as they extend E., a vertical face of over 100ft. by 450ft. long on the line of lode, from which an enormous amount of ore can be extracted cheaply, and worth in bulk as broken from 4 per cent. to 6 per cent. copper. Five tunnels, from 100ft. to 230ft. in length, have been driven into the hill at different points. The width of the ore-bearing material disclosed in some of these is from 50ft. to 100ft., and consists of gritty quartz, kaolin, and decomposed slates, impregnated with green carbonate, grey ore, and red oxide. Some dressed ore sent away by tributers gave a return of 27 per cent. copper.

Excavations for the foundations of the smelting plant are in progress, and the manager intends to have the furnaces erected and the plant in full going order as speedily as possible. The prospects of these properties are exceedingly encouraging, as with such large deposits of ore to operate on and a good supply of water, the venture should certainly prove remunerative. (10-7-08.)

COCKSCOMB.—Situated 2 miles E. from Yuda. A vertical shaft 8ft. x 4ft. in the clear is sunk to a depth of 60ft., and at that level a crosscut has been put in S. for a distance of 21ft. where the lode was intersected, from 5ft. to 8ft. wide, striking N.E. and S.W., dipping N.W., and consisting of quartz and gossan, with grey ore, red oxide, and green carbonate. Driving has been carried on both ways for a distance of 50ft. From the S.W. drive a winze has been sunk to a depth of 25ft., and the ore body, both in the drives and winzes, looks promising. To work it to the best advantage the main shaft should be continued another 50ft. or 60ft. to intersect the lode. The ore treated gave an average of 25 per cent. copper. (11-7-08.)

WEALTHY KING.—Situated $\frac{3}{4}$ of a mile E. of Yuda. Two parallel lodes traverse this property, strike E. and W., dip nearly vertical. A considerable amount of work has been done on both lodes at different points along the line of strike for a distance of fully $\frac{1}{2}$ a mile. The workings consist of shallow pits and open cuts to depths of from 4ft. to 15ft., showing ore-bearing material from 5ft. to 10ft. wide of ferruginous quartz and kaolin, with veins of green carbonate, grey ore, and red oxide. A fair quantity of ore has been treated from the various workings, returning from 20 per cent. to 30 per cent. copper. Near the W. end of the property some prospecting has been done, disclosing several small veins of high-grade copper ore, striking N. and S. across the country rock. The prospects are encouraging, and warrant deeper sinking to test and develop the lodes at greater depths. (11-7-08.)

BLACK QUEEN (*vide* page 30, Record).—Three shafts have been sunk at the E. end of the property to depths of from 40ft. to 50ft. on a lode striking N.E. and S.W., dipping N.W. At the 30ft. level drives have been made both ways for 50ft., a little stopping done in both, and a fair amount of ore taken out. The formation is 5ft. wide, of clayslate and gossan, with carbonates, grey ore, and red oxide throughout. E. of the shaft a considerable amount of work has been done in an open cut

15ft. long and 12ft. deep on the same formation. Thirty tons of 25 per cent. ore have been treated from these workings. At the W. end of the property five shafts have been sunk to depths from 40ft. to 100ft., and a considerable amount of driving and stoping done at the 90ft. and the 50ft. levels, from which great quantities of high-grade ore have been extracted, averaging up to 30 per cent. copper. (11-7-08.)

STANLEY (*vide* page 134, Record).—Situated $2\frac{1}{2}$ miles E. of Daly Bluff. A number of shafts have been sunk to various depths on the different lodes that traverse this property, and, judging from the dumps, a fair quantity of high-grade copper ore has been taken out of the workings. (13-7-08.)

KOSKE'S CLAIM.—Situated 3 miles E. of Daly Bluff. On a small quartz lode outcrop striking E. and W. a shaft has been sunk to a depth of 14ft. The lode is from 6in. to 9in. wide, enclosed in diorite, and at the bottom a drive has been put in W. 10ft. At this point the lode is cut off by a fault, and probably the good gold that was obtained came from near this fault. Three samples taken at the time of my inspection assayed—E. end of shaft, 3dwts. of gold per ton; W. end, nil; surface dump, 16dwts. gold per ton. (13-7-08.)

GOLDEN POLE (also known as the PARALANA and the BRINDINA—*vide* pages 37 and 264, Record).—Situated $2\frac{1}{2}$ miles E. of Mount Fitton South Mine. A lode traverses this block, on which several shafts have been sunk to depths of from 20ft. to 100ft. The formation is from 2ft. to 3ft. wide, of ferruginous quartz, with green carbonate, and it looks favorable for carrying a little gold. About 200ft. S. of the above an underlie shaft has been sunk to a depth of 30ft. on what appears to be a parallel lode of from 6in. to 2ft. wide, with carbonates and grey ore. (16-7-08.)

CLAIM $2\frac{1}{2}$ MILES E. OF MOUNT SHANAHAN.—An underlie shaft has been sunk to a depth of 20ft. on a formation 8ft. to 10ft. wide, composed of ferruginous quartz, with green carbonate and grey ore. It was stated that 4 tons of 21 per cent. had been marketed. E. of the shaft a little prospecting work has been done by shallow pits and open cuts, disclosing copper orebearing material (15-7-08.)

HAMILTON (*vide* page 61, Record).—Work is in progress in an underlie shaft, sunk 70ft. on a lode striking N.E. and S.W., dipping S.E. At the bottom driving has been started S.E. on the course of the lode, which consists of ferruginous material, with veins of grey ore and green carbonates for a width of 4ft. There are two other formations traversing the block, on which several shafts have been sunk to depths of from 30ft. to 50ft., and from all these high-grade ore has been extracted. The formations disclosed in the old workings are from 5ft. to 6ft. wide, with veins of grey ore, red oxide, and green carbonate of high grade. The present holder has had two tons treated, which gave a return of 27 per cent. copper. N.E. of the present workings there are strong indications of the formations converging, and they have every appearance of forming into one body on their N.E. course. To further develop these promising ore bodies a vertical shaft should be sunk near where they appear to join, and this would save a lot of crosscutting. (15-7-08.)

MOUNT FITTON SOUTH (*vide* page 89, Records).—A tunnel has been driven into the hill for a distance of 220ft., and at that point connection was made with the bottom of the underlie shaft sunk on the lode from the hilltop. Stoping is carried on both N. and S. above the tunnel. The formation is from 10ft. to 15ft. wide, with rich veins of grey ore, red oxide, and green carbonate. At a distance of 170ft. in the tunnel a winze has been sunk to a depth of 40ft., to water-level. The ore channel in the bottom is 12ft. wide, with thick veins of grey ore and rich patches of yellow sulphide. At the bottom of the winze driving is in progress S. on the hanging-wall portion of the lode, which consists of quartz, gossan, grey ore, red oxide, and yellow sulphide. The ore body in this, the lower workings, is going down strongly, and it will probably continue to a considerable depth; but to work it to the best advantage a shaft should be sunk a little E. of the tunnel to intersect the lode, and then drives extended under the present workings. During the last six months 498 tons of ore have been treated by the concentrating plant on the mine, and $62\frac{1}{2}$ tons of 35 per cent. concentrates obtained. (15-7-08.)



NORTH-EASTERN PROSPECTORS.



MAIN SHAFT, QUEEN BEE MINE, NORTH-EAST.

(To face page 38.)

MOUNT FITTON MINE (also known as **BILLY SPRINGS**).—No work has been done here for some time. Some of the ore contains a high percentage of zinc. Full details of the workings are given at page 89, Records. (14-7-08).

WARNER'S (*vide* page 151, Record).—On a large lode formation some prospecting work has been done at different points along the line, disclosing quartz and quartzite strongly studded with carbonates of copper for a width of 15ft. The ore taken out from the various workings on the outcrop, it was stated, returned 25 per cent. copper. Near the brow of the hill the outcrop of a parallel lode is visible, striking E. and W., dipping S. A vertical shaft has been sunk to a depth of 30ft. This went through the lode at 10ft., the last 20ft. of sinking being in the footwall country. The formation is 2ft. wide, of ferruginous matter, with blue and green carbonates; but deeper sinking should be done to test the lodes at depth. (15-7-08.)

PINNACLES (*vide* page 118, Record).—Three miles S.W. of Mount Fitton South Mine. There are two formations traversing this property, striking N. and S. On the E. one a shaft has been sunk to a depth of 20ft. The lode consists of quartz and ironstone, with veins of grey ore and green carbonate of promising appearance. Two chains S.E. four underlie shafts have been sunk on the W. lode to depths of from 20ft. to 70ft., where the formation is 4ft. wide, of decomposed granite, with blue and green carbonates and grey ore. (15-7-08).

MOUNT SHANAHAN.—Five miles W. of Mount Fitton Mine. The main workings are situated on top of a granite hill 500ft. high, from the bed of Hamilton Creek. Two N. and S. lodes traverse the hill, and also two E. and W. Two shafts have been sunk—the one on the E. and W. is 40ft. deep, and the lode is 5ft. wide, stained with carbonates and small veins of grey ore; and the other is 80ft. deep, on a N. and S. lode, 10ft. wide, with carbonates and grey ore through the matrix. Several shallow pits and open cuts have been sunk at different points along the outcrops, disclosing the formations, which consist of quartz and iron, thickly impregnated with green carbonates and grey ore. All the lodes are well defined, and are worth further prospecting. On the W. side of the hill a tunnel has been put in for a distance of 130ft., where connection was made with an underlie shaft 50ft. deep, and a considerable amount of work has been done on the lode here from both shaft and tunnel. Further down the hill No. 2 tunnel has been put in for a distance of 60ft., and several small veins of mineralised quartz were intersected, stained with copper, but not payable. (15-7-08.)

GOW'S COPPER CLAIM.—Situated 7 miles E. of Mount Fitton Springs. On a lode formation striking E. and W. several shallow pits have been sunk to depths of from 4ft. to 10ft., disclosing ferruginous lode material, with green carbonate, grey ore, and copper glance for a width of from 6ft. to 10ft.; it is promising and worth further prospecting. Samples from along the outcrop have, it is stated, assayed as high as 32 per cent. copper and from 4ozs. to 13ozs. silver per ton. (16-7-08.)

PARABARANA (*vide* page 109, Record).—The principal workings are situated on the E. side of the range and about 200ft. above the plain. The formation operated on was from 3ft. to 6ft. wide, of ferruginous material, with green carbonates and grey ore. S. of the main workings and further up the hill some work has been done by open cuts on a large ironstone outcrop, strongly stained with green carbonates for a width of 10ft. (17-7-08.)

MINERAL CLAIMS NEAR PARABARANA HILL.—A considerable amount of work has been done on different parts of these blocks by shallow pits and open trenches, disclosing copper lodes, from 1ft. to 4ft. wide, carrying green carbonates and grey ore, and a fair quantity of payable ore must have been obtained. (17-7-08.)

ELSIE ADAIR (*vide* page 51, Record).—The main work in progress at present is on a hill 50ft. high, and consists of an underlie shaft sunk to a depth of 40ft. on a lode formation striking N. and S., and dipping W., and consisting of ferruginous slate with veins and bunches of green carbonate, ruby oxide, and grey ore, for widths of from 2ft. to 5ft. It has a favorable appearance, and is likely to be persistent in depth. Forty tons of 10 per cent. ore have been sent away

this year from these workings, and another 8 tons of 20 per cent. are on the surface. About 300yds. N. from the above a shaft has been sunk to a depth of 130ft. on a well-defined lode, striking E. and W. At the bottom drives have been put in on the course of the lode E. 30ft. and W. 120ft. At this point connection was made with No. 2 shaft for ventilation. A considerable amount of stoping has been done above the drives to within 30ft. of the surface. The lode operated on here is siliceous slate, with seams of grey ore and green carbonate for widths of from 2ft. to 6ft. A great quantity of 15 per cent. ore has been sent away from these workings. The lode has been proved to have a great length, and appears likely to continue in depth. To further develop it the shaft should be sunk deeper and equipped with winding plant. (20-7-08.)

DIAMOND JUBILEE (*vide* page 49, Record).—Two well-defined lodes striking E. and W. traverse this property; they are about 3 chains apart, and several shafts have been sunk on both to depths of from 20ft. to 90ft. From all of these a considerable amount of work has been done, and great quantities of payable ore extracted. Work is carried on at present from a tunnel driven into the hill for a distance of 200ft., and at that point the S. lode was intersected, from 4ft. to 10ft. wide, of slate, quartz, and gossan, containing rich bunches of carbonates and ruby oxide. From the end of the tunnel drives were made both ways on the course of the lode. The W. drive has been extended 127ft., and at that point connection was made with an underlie shaft 90ft. deep, thus making good ventilation through the workings. The E. drive at 130ft. connected with another shaft. Some large pockets of fairly rich ore were met with in this drive. A considerable amount of stoping has been carried on above the drive for a length of 110ft. At a point 65ft. in a winze has been started and sunk to a depth of 9ft., and this should be continued down to prove this promising lode to a greater depth. The present party took the mine on tribute in November, 1907, and have sent away 75 tons of 20 per cent. ore, and another 9 tons bagged. (20-7-08.)

MOUNT COFFIN (*vide* page 87, Record).—Work is carried on at present on the W. block, where an underlie shaft has been sunk on the lode to a depth of 87ft. At the 50ft. level a drive has been put in E. along it for 137ft., and at 80ft. underhand stoping is carried on. The lode is 3ft. wide, with veins of high-grade grey ore and green carbonate from lin. to 3in. thick. The formation looks promising, and is well worth being tested and developed at greater depth. (20-7-08.)

CLAIM 1 MILE W. OF DIAMOND JUBILEE.—Six shallow open cuts, from 8ft. to 10ft. deep and 6ft. to 20ft. long, have been sunk on a siliceous formation, impregnated with green carbonate for a width of 10ft. All the ore taken out of these workings was sent to the Blinman smelters. The formation has been traced for a distance of 3 chains E. and W., and it is well worth further prospecting. (20-7-08.)

COPPER KING (*vide* page 45, Record).—The workings are on the side of a hill 40ft. high, and consist of a large open cut 50ft. by 60ft. and 20ft. high in the face, with two tramlines going down into them about 40ft. apart. The deposit operated on, which is of considerable width, consists of ironstone and iron oxide of high value in pigment of various colors, for which it is principally worked at present; it also contains pockets of green carbonate and grey ore. Seventeen tons of sienna have been sent away to an Adelaide firm lately, and another parcel was being prepared for dispatch. Several shafts have been sunk on the property, from 20ft. to 140ft. deep, and in each of these the iron oxide is prominent, proving that there is a great quantity of it available at a comparatively shallow depth. A small levigating plant for experimenting purposes has been erected, and if this proves a success an up-to-date plant will be installed. (22-7-08.)

MOUNT BAYLY (*vide* page 92, Record).—A large formation strikes E. and W. Seven shafts have been sunk along the line, from 20ft. to 132ft. deep and from 40ft. to 100ft. apart. Driving and stoping have been done at different levels, and a considerable amount of ore obtained. The lode consists of decomposed slate and kaolin, with green carbonate disseminated through it for a great width. (22-7-08.)

AJAX (*vide* page 20, Record).—Work at present is on block 5845, where two shafts have been sunk, 90ft. and 60ft. From the bottom of the 60ft. shaft drives have

been made on the lode N. 8ft. and S. 30ft. ; at that point a winze has been started and is now down 13ft. The formation in the winze is 4ft. wide, and it consists of ferruginous quartz and slate, with pockets and veins of carbonates and grey ore of high percentage. (22-7-08.)

WORKINGS NEAR THE COPPER KING—Lease No. 2045.—Adjoining Copper King. Some prospecting work has been done on the property, and several shallow pits have been sunk, from 4ft. to 6ft., but nothing of any value appears to have been discovered.

Claim No. 8505.—Half a mile S. of Copper King. Several prospecting shafts have been sunk, from 5ft. to 20ft. deep, on a large ironstone outcrop, disclosing a little ochre and sienna, but not in sufficient quantity to pay.

Claims Nos. 8440, 8441.—Near Copper King. Some shallow prospecting work has been done at various places on the blocks, but nothing encouraging was found. (23-7-08.)

WARRIOOTA (*vide* page 145, Record).—A fairly well-defined lode formation bears E. and W., dipping N., and can be traced on the surface for a distance of 4 chains. A considerable amount of work has been done along the line by shallow open workings, from 4ft. to 8ft. deep, and four shafts have been sunk to considerable depths. The ore body disclosed in the various workings consists of ferruginous and siliceous slate, impregnated with carbonates and grey ore, for a width of 4ft. ; it does not appear of high-grade in bulk, but could be readily dressed to a high percentage. (23-7-08.)

LADY MILLICENT (formerly known as **NORTH MOCHATOONA**—*vide* page 83, Record).—A well-defined lode here strikes N. 20° E., and dips E. It is composed of ferruginous calcite and slate, with copper pyrites thickly impregnated through the whole formation. Work is carried on at present from a vertical shaft, 6ft. by 4ft. in the clear, which is closely timbered to a depth of 55ft., and has been lately equipped with winding and pumping plant, which are working satisfactorily, and there is no difficulty in keeping the water out of the workings. Driving both ways on the course of the lode is carried on from the bottom of the shaft. The S.W. drive is in 21ft., and the formation in the face is 9ft. wide, of calcite and slate, thickly impregnated with copper pyrites. The N.E. drive is in 60ft., and the ore body in the face is 10ft. wide, densely studded with copper pyrites. Throughout the workings the lode is strong and well defined, and has every appearance of persistence in depth. Ten chains W. of the main workings a shaft has been sunk to a depth of 130ft. on a well-defined lode 3ft. wide, striking N. and S., dipping W. A considerable amount of driving and stoping has been done at the 100ft. level, and great quantities of high-grade ore extracted. Three samples taken from the main shaft at the time of my inspection gave, on assay, the following results:—No. 1 dressed ore, 33.6 per cent. copper ; No. 2, S.W. drive, 1.8 per cent. ; No. 3, N.E. drive, 10.9 per cent. (24-7-08.)

ANGEPENA TREASURE (*vide* page 200, Record).—About 100ft. up the side of the hill an underlie shaft has been sunk 30ft. on the footwall of a large formation, consisting of ferruginous decomposed slates, with well-defined footwall, and no hanging-wall showing in the shaft. Several prospecting holes have been sunk along the line for a length of from 5 chains to 6 chains, and similar lode material disclosed. Three samples taken from the formation assayed—Nos. 1 and 2, nil ; No. 3, 1dwt. of gold per ton. (24-7-08.)

BOULDER BLOCK.—Two miles N.E. of Mochatoona Springs. A well-defined lode can be traced on the surface for 4 chains. An underlie shaft has been sunk 50ft. on the formation ; at that level a drive is in progress N.E. on the lode, now in 15ft. The ore body, both in the shaft and in the drive, is 10ft. wide, and consists of ferruginous calcite, copper pyrites, and malachite, assaying in bulk from 8 per cent. to 9 per cent. copper. The workings of this mine are lit with acetylene gas, and the proprietor finds that it is very much cheaper than candles. About 5 chains N.W. from the main workings a considerable amount of shallow prospecting work has been done on two other lodes, bearing N. and S., dipping W. They are well defined, from 3ft. to 4ft. wide, and composed of calcite, thickly studded with copper pyrites

and malachite. All the lodes on this property are highly encouraging, being well defined and wide, with every indication of persistence in depth. Three bulk samples of the ore assayed—No. 1, bottom of workings, 8.7 per cent. copper; No. 2 dump, 9.5 per cent.; No. 2 lode, 8.7 per cent. (24-7-08.)

PEER MAHOMET.—Situated adjoining Mochatoona Mine. The outcrop of a well-defined copper lode 2ft. wide can be traced on the surface for a distance of 3 chains, striking N.E. and S.W. A little way up the hill a tunnel has been driven on its course for a distance of 50ft.; at 35ft. it connected with a shaft 40ft. deep sunk on the lode, which is 3ft. wide, and consists of ferruginous slate and gossan, with stains and small bunches of carbonates and grey ore. Near the top of the shaft No. 2 tunnel has been started on the course of the lode and extended a distance of 20ft. The formation in the face is 3ft. wide, of slate and gossan, with veins of grey ore, ruby oxide, and copper glance. Both in the workings and along the outcrop the formation appears highly encouraging, and is well worth prospecting to greater depth. Two samples taken by me gave on assay:—No. 1, from the face of No. 2 tunnel, 7.7 per cent. copper; No. 2, from dump of dressed ore, 30 per cent. copper. (24-7-08.)

MOCHATOONA (*vide* page 83, Record).—Half a mile from Mochatoona Springs. No. 1 tunnel has been extended to 150ft., and at 50ft. stoping is in progress, lode being 2ft. wide, and consisting of ferruginous quartz and slate, impregnated with carbonates. No. 2 tunnel has been started on the course of the lode, and at 20ft. in a winze has been sunk to a depth of 40ft. The formation all the way down is from 3ft. to 4ft. wide, of ironstone, gossan, and slate, with green carbonate throughout. N.E. of the above workings a shaft has been sunk to a depth of 30ft. on a small vein, striking N. 70° E., and consisting of quartz and iron with grey ore and green carbonate of high grade. Five tons of 18 per cent. and 1½ tons of 25 per cent. ore have been treated from this shaft. About 60ft. further up the hill is a shaft 18ft. deep, and a drive is in progress S.W., now 24ft., on the course of the lode. The vein is from 3in. to 12in. wide, carrying rich copper ore, malachite, and copper pyrites. A sample gave on assay 26.3 per cent. copper. No. 2 sample, from the new show, gave 22.3 per cent. copper. (24-7-08.)

CLAIM W. OF ANGEPENA TREASURE.—A considerable amount of prospecting work has been done on this block, and a great number of shallow holes and trenches sunk to depths of from 2ft. to 4ft., disclosing small veins of ferruginous quartz, carrying a little gold and silver, but evidently not sufficient to pay for working. Two samples taken from various veins, 3in. to 5in. thick, gave on assay the following results:—No. 1—3dwts. of gold, 5ozs. 9dwts. silver per ton, and 5.1 per cent. copper; No. 2—5dwts. of gold, 6ozs. 4dwts. silver per ton, and 3.1 per cent. copper. (25-7-08.)

CLAIM 1 MILE E. OF OLD ANGEPENA STATION.—An underlie shaft has been sunk to a depth of 35ft. on a lode striking N.W. and dipping S.W.; it is from 3ft. to 4ft. wide, of ferruginous quartz and slate, carrying rich pockets of carbonates and grey ore. A considerable amount of work has been done N.W. of the shaft in an open cut 150ft. long and 12ft. deep, the formation being from 6ft. to 10ft. wide, with seams and splashes of carbonates. It is stated that some rich patches of ore were extracted from this cutting, averaging 18 per cent. copper. (25-7-08.)

COPPER QUEEN.—Situated 3 miles W. of Beltana. On a lode formation, striking N.E. and S.W., three shafts have been sunk, the deepest being 80ft. Along the line of strike between these shafts a considerable amount of work has been done by open cuts from 6ft. to 10ft. deep, from which a great quantity of copper ore has been obtained. The formation disclosed in the various workings seems well defined, and should be developed to a greater depth. (27-7-08.)

EDIACARA SILVER-LEAD (*vide* page 168, Record).—At Greenwood's underlie shaft driving and stoping are in progress on the course of the lode, on both sides of the shaft. The formation operated on is from 2ft. to 3ft. wide, carrying high value in silver and lead. About 4 chains S. of the main workings a number of men are employed in open cuts, on an almost horizontal deposit of from 18in. to 2ft. wide, with from 4ft. to 5ft. overburden. The water-jacket furnace was kept going full time, and about 50 men are employed on the property. (27-7-08.)

CLAIM ADJOINING THE EDIACARA.—The workings are on the brow of a small hill, and consist of an open cut 30ft. long by 30ft. wide, on an ironstone formation, from which 15 tons per day of ironstone are quarried out, and are sent to the Ediacara smelter for flux. (28-7-08.)

BLACK EAGLE.—One mile S. of Ediacara Mine. A large ironstone formation outcrop, which can be traced on the surface for a considerable distance, strikes N. and S. The main workings are situated on the side of the hill, 75ft. above the plain, and a tunnel has been driven for a distance of 70ft., cutting across the formation at nearly right angles. In the tunnel the ore-bearing material occurs in large boulders of iron and calcite, thickly studded with malachite. At 30ft. in, on the N. side of the tunnel, a vertical winze has been started, which is 6ft. by 5ft. in the clear, closely timbered with gum planks, 4in. thick. The winze is 10ft. deep, and the formation in the bottom appears to be getting more compact, and of a higher grade. Sinking should be continued to intersect the footwall, then cut across the formation to the hanging-wall, to find its full width and value. Four samples taken at the time of inspection assayed—No. 1, bulk, from the bottom of the winze, 11.4 per cent. copper; No. 2, seconds, 6.7 per cent.; No. 3, picked sample, 19.3 per cent.; No. 4, from tunnel, 8.7 per cent. With such a large deposit of fairly high-grade ore, the future prospects of this property are highly favorable. (28-7-08.)

FOUR-MILE CLAIM.—Situated 4 miles S. of Beltana. A lode formation traverses this block, strike N. and S., dip nearly vertical, on which three shafts, about 50ft. apart, have been sunk, judging from the dumps, to depths of from 60ft. to 80ft. About $1\frac{1}{2}$ chains N. of these, on the line of lode, some prospecting work has been done from an open cut. The formation operated on consists of ferruginous quartz and slate, with small seams and splashes of carbonates through the matrix, apparently of low grade. The lode has been disclosed in the various workings for fully 3 chains in length, and proved to be of fairly uniform width of from 18in. to 2ft., and it is well worth further prospecting to greater depth. (30-7-08.)

TARCOOLA BLOCKS (*vide* page 286, Record).—The richest gold so far has been proved to occur where the reefs cut through the slate country and on the various breaks, and in most of the reefs it occurs in shoots dipping S. and conforming to the dip of the slate beds. There are several beds of slate traversing the property, alternating with beds of quartzite overlying the granite, but so far the reefs have only been operated on in two of these beds, which will be referred to later as N. and S. beds, and in each of them the reefs carried good gold. The N. bed is from 50ft. to 60ft. thick; four reefs in the Tarcoola Blocks workings have been operated on in it with phenomenal results in gold-production, from the surface down to No. 3 level, or No. 1 level, new shaft. These reefs have been worked from the surface to this level in the S. bed of slate, and in each of them a great quantity of gold was obtained. Below No. 3 level practically no work has been done on the reefs in either of the auriferous belts of slate. Overlaying the N. bed the quartzite is 370ft. thick, with thin layers of slate between the bedding. All the reefs traversing this belt of country are fairly well defined, and carry rich pockets of gold in places, near the line of contact with both the N. and S. beds. Most of the reefs have been found to carry payable gold for a considerable distance in the quartzite belt of country. Overlaying the quartzite is the S. bed of slate, 150ft. thick, and all the reefs operated on from the Tarcoola Blocks workings in this belt have produced some thousands of ounces of gold. The reef traversing this bed is fairly regular in its course throughout the workings, thinning out and thickening along the line to from 9in. to 18in. thick, of ferruginous quartz with specks of galena, and a fair quantity of pyrites of high value in gold well worth saving, some of the blanket concentrates yielding 15ozs. of gold per ton.

Present Workings.—The new vertical shaft is situated 500ft. S. of the underlie shaft and, according to the dip of both the gold-bearing strata and the shoots of gold, should cut the main (or N.) bed of slate at 350ft. from the surface. The shaft is 12ft. by 4ft. in the clear, and well timbered with jarrah from the surface to the bottom, a depth of 280ft. 6in., and divided into three compartments of 4ft. each.

At a depth of 100ft. (No. 1 level) a plat has been made. This is connected with the E. crosscut, driven from McKechnie S. drive (from No. 3 level underlie shaft), and this crosscut has been extended E. for a distance of 338ft., several quartz leaders, from 2in. to 8in. thick, being met with at various distances along it, some of which when further developed may turn out good reefs. The crosscut does not appear to be quite far enough E. to intersect Minnis' reef, in which fairly good gold was obtained near the surface. W. from the S. drive the crosscut has been extended 60ft., when the W. branch of McKechnie's reef was intersected in the S. slate carrying good gold. The N. drive on this lode is in 70ft., and the S. drive 27ft., and a rise has been put up 50ft., from which a little stoping has been carried on both N. and S. The S. drive on this lode should be extended and the rise carried up to the surface. That would render a considerable amount of ore available for stoping, and the workings would be well ventilated. Further W. 70ft. in the crosscut Fabian's reef was intersected, but the only work done on it at this point is driving N. 12ft. and S. 12ft. The S. drive should be continued into the auriferous belt, when there is every chance of getting good payable ore. In the other reefs operated on in this belt the ore shoot was 150ft. long, and a great quantity of payable ore has been extracted from it during the last three years.

No. 2 Level (250ft. from the Surface).—A plat has been cut out at this level, and from it a crosscut has been put in E. At 22ft. McKechnie's reef was intersected, where it carried good gold. Driving has been done S. on the reef for a distance of 208ft. in quartzite country, and the reef for the first 100ft. was from 9in. to 12in. thick, and at that distance a diorite dyke came in on the W. side, displacing the reef and following its channel in a S.E. direction for a distance of 100ft. From that point driving was carried on due S. for 8ft., when the S. bed of slate was met with, also from 3in. to 6in. of quartz on the E. and W. walls. The S. drive on this reef should be continued, to prove the reef in the gold-bearing country, and, should it equal in quality the portion in the top level, a great quantity of milling ore would be made available. The N. drive opposite the last on McKechnie's has been extended 45ft., and there is every indication that it is just entering the highly auriferous N. belt of country from which fully three-quarters of the gold won from the mine has been obtained. There should be no hesitation in extending this drive at the first opportunity. From McKechnie's reef the W. crosscut has been extended 152ft. in quartzite country, and at that point the W. branch reef was intersected, from 9in. to 12in. thick, and carrying fair gold when first cut. Driving has been carried on N. on this reef branch. At 122ft. the slate bed was met with and the reef was cut off by a fault. Driving was continued, and at 182ft. the reef coming in from the E. side was struck again, and is from 2ft. to 6ft. of solid quartz. Driving back S. to the fault should be done here; also a rise should be put up, as the little work done on it so far is not sufficient to condemn such a valuable discovery, and by doing more there is a chance of coming on the rich shoots of ore operated on in this reef at the upper level. At a distance of 102ft. in the last drive a crosscut has been put in W. 50ft., where a branch of Fabian's reef was intersected, from which some nice specimens of gold were obtained. A rise has been put up 36ft., following a small stringer of quartz, probably a branch of the main reef. This rise should be continued up through to the underlie shaft for the purpose of ventilating these lower workings, independent of other discoveries that may be made in the operation. The discovery of Fabian's reef, or, rather, a part of it, at this level, carrying gold, should be sufficient inducement to prospect for the main body of it thoroughly in the slate country, where it is known to make several faults. A considerable amount of good and necessary work has been done at the 250ft. level, and all the reefs that were driven for have been intersected and found to be about their usual value in the country traversed. All the reefs are fairly well defined and strong in the quartzite country, where most of the work at this level has been carried out. From all that I can see in the bottom workings, and from my previous knowledge of this kind of formation, I am quite convinced that they are well worthy of being developed in the various places mentioned.

I am very much impressed with the prospects of the mine at the lower levels, where nearly all the crosscutting and driving has been done in the quartzite country, in which the reefs do not carry much gold. So it is well worth extending some of the drives on the reef into the black slate country, where they have been found to carry good gold. (30-9-08.)

GLENLOTH (*vide* page 311, Record).—The future prospects of the field are highly promising. On the Glenloth Battery and Mining Company's property, *Fabian's* No. 3 has been proved for a length of 800ft. and to a vertical depth of 85ft. In the bottom workings the reef looks fairly strong, and likely to be persistent in depth, and, being from 1ft. to 2ft. wide, carrying payable gold, it has every prospect of producing great quantities of crushing material. One mile S.W. of Glenloth Well, *T. Collins* is working at a depth of 30ft. on a very promising reef 18in. wide, carrying payable gold, and it has been proved for 50ft. in length. It looks defined and strong, and likely to continue down. *Glenmarkie*.—There appear to be two defined lodes traversing the leases, 12ft. apart. The one operated on is from 2ft. to 2ft. 6in. wide, from which 500 tons of payable ore has been extracted. When the reef is intersected from the new vertical shaft at 150 level, a great quantity of ore will be available for stoping. *Kavanagh and Simon's Claim*.—The lode worked on this property is from 18in. to 20in. wide, well defined, and of high value. Fifty tons treated last month gave a return of 31dwts. of gold per ton. The reef in the underlie shaft for a depth of 40ft. is of fairly uniform thickness all the way down. At that point a diorite dyke has faulted the reef, apparently causing a down-throw of a few feet. The sinking of the shaft should be continued through the fault for at least 12ft. or 15ft., then put in a short crosscut in each wall. That would give a fair chance of picking up the reef inside the fault.

There are several other reefs traversing the field on which some work has been done with highly satisfactory results. The area over which gold-bearing reefs have been discovered is extensive, and should, when further developed, produce a fair quantity of gold. (8-10-08.)

WANDILTA (*vide* page 144, Record).—Situated about $\frac{1}{4}$ of a mile E. of the Kadina township, on Government land. The Government diamond drill was at work on this property for some time. Five boreholes have been put down to depths ranging from 400ft. to 1,400ft. In all of these ore-bearing formations of varying thicknesses and values were intersected. In No. 5 bore, the last and deepest one, highly encouraging results were obtained, in width and value, at both 156ft. and 319ft. To further prove these highly promising formations cut in the bore holes, it was decided to sink a prospecting shaft. This was started 45ft. E. of No. 5 bore; it is 6ft. by 4ft. in the clear, and is close-timbered to the bottom. At a depth of 30ft. the first lode was intersected, striking N.W., and was fairly flat, dipping a little S.W. It was 3ft. wide, consisting of calcite and iron, with green carbonate, grey ore, and red oxide. No work has been done on this formation up to date, but no doubt it will be further developed later on. The sinking of the shaft was continued to a depth of 60ft., and this being water-level it was deemed advisable to commence crosscutting both ways to test the lodes. The W. crosscut has been extended 50ft., and strong indications of ore were met with, green carbonates being thickly disseminated through the country rock for fully 3ft., but with no defined walls. A drive was put in S. on it for a distance of 10ft., but, as it did not improve, this work was discontinued. The E. crosscut from the shaft has been extended 125ft., and two formations were intersected. The one at 50ft. in is 12ft. wide, composed of calcite, quartz, and iron, and its dip and bearing correspond with the lode intersected in No. 5 bore at 319ft., from which the core gave fair average value in copper. The other formation passed through in the E. crosscut is 10ft. E. of the shaft, and is from 5ft. to 6ft. wide. It appears well defined, dips 1 in 3 W., and appears to be the lode intersected in the bore at 156ft. Driving in a S. direction has been done on this lode for a distance of 40ft. At 14ft. a well-defined hanging-wall was met with. The lode here was rich in green carbonates, grey ore, and red oxide for a width of 2ft. At this point a winze has been sunk to a depth of 10ft. in high-grade ore. The bottom of the winze appears to be just getting

into the sulphide zone, and the rich part of the lode is near the hanging-wall. It is from 18in. to 2ft. wide, going down strong, and has every appearance of continuing down to a great depth. At a distance of 19ft. in this drive a winze has been sunk to a depth of 6ft. in rich ore, and further in near the face of the drive the shoot of ore dips underfoot. Owing to the quantity of water making in both the winzes, it will hardly be possible to prove the ore body below until the mine is equipped with pumping plant. The N. drive from the E. crosscut has been extended 11ft. The lode in the face of this drive is looking strong and well defined, and is 5ft. wide. Two feet of the hanging-wall portion is rich in green carbonate, grey ore, and red oxide. The ore shoot appears to have a S. dip, rising going N., so that as the N. drive is extended more ore will be available above the drive in that direction. From the S. drive a rise has been started on the footwall portion of the lode, where some fair boulders of grey ore were obtained. This may lead up to a second shoot of ore above the level. From the highly encouraging appearance of the lode in the present workings, development at depth is fully warranted, and this could be done at a comparatively small cost by equipping the present shaft with a small winding plant and pump, and continuing the shaft down a further depth of 100ft., making a total of 160ft. At that depth crosscutting could be carried on to prove all the formations intersected in the boreholes, when it is highly probable that satisfactory results will be met with. (4-11-08.)

HAMLEY (*vide* page 61, Record).—There are six copper lodes traversing the property in a N.E. direction, and dipping to the W. A considerable amount of work has been done on three of these, viz., the Beddome, the E. lode, and the E. portion of the Karkarilla lode, and some thousands of tons of payable ore have been extracted from the various workings. On the Karkarilla lode three underlie shafts have been sunk—No. 3, the S. one, to a depth of 92 fathoms; No. 2, on the same line of lode, 570ft. further N., 120 fathoms; and No. 1, situated 132ft. N. of No. 2, 92 fathoms. These three shafts are connected by drives at various levels down to the 90 fathoms, and a considerable amount of stoping has been done along the line of lode for a length of 800ft. The lode operated on at present is situated 15ft. W. from the old workings; it appears to be the hanging-wall portion of the main body, and is comparatively a new body of ore intact, with the exception of the work done to prove it at the various levels. Crosscuts have been driven W. at 40, 50, 60, and 70 fathom levels, in each of which the ore body was intersected at a distance of 15ft. W. of the footwall portion, or the old workings. Winze-sinking has been carried down from the 50-fathom level to the 70, connecting these workings and making the ventilation good. At each level from 40ft. to 100ft. of driving has been done on the course of the lode, also a start has been made to stope out the ore between each level. In all these workings the ore body is from 3ft. to 7ft. wide, well defined, and appears likely to continue through the property; and, considering that it has already been proved to a depth of 70 fathoms, a great quantity of ore is available for operating on. The future prospects of the mine are highly encouraging, and warrant further developing, and if equipped with more modern winding plant and better facilities for transit of ore from the mine to the treatment plant, it should soon prove to be a fairly remunerative mine. (5-11-08.)

DUNN'S HOMEWARD BOUND (*vide* page 246, Record).—A well-defined lode can be traced for a distance of 1 mile. The principal workings consist of four underlie shafts, trenches, and open cuts, disclosing lode material, from 6in. to 15in. wide, of calcite, quartz, and ironstone, carrying rich gold, associated with bismuth, which occurs in patches in the lode. No. 1 shaft has been sunk to a depth of 110ft. The lode is well defined in the bottom, and is from 6in. to 12in. wide. At 75ft. drives have been made E. and W., the latter for a distance of 180ft., and connected with No. 2 shaft. A considerable amount of stoping has been done from this level to the surface, from which some very rich patches of gold were obtained. No. 2 shaft, 180ft. W. of No. 1, has been sunk 75ft., and driving has been carried on at this level to No. 3 shaft, and the ore between the two has been stoped out with good results, some patches of the ore being very rich in gold and bismuth. No. 3 shaft is 75ft., and most of the ore from that level upwards has been stoped out. No. 4 shaft, 3 chains W. of No. 3, is 70ft., and all the work in progress at present is done

from this shaft. Sinking and stoping are carried on at the bottom, the lode being from 6in. to 12in. wide, of ferruginous calcite, carrying rich patches of gold and bismuth. Recently a parcel of 1 ton 12cwts. of ore from this shaft was treated at the Government Cyanide Works, Petersburg, and gave a return of 13ozs. of gold per ton. Some hundreds of tons have been treated from other parts of the workings, from which excellent results were obtained. At the bottom of the present workings a slight change in the country rock is noticeable, being a little harder and not so easily worked, but it does not appear to affect the lode in any way, which keeps just as wide and strong, and will probably be found to carry as much gold as in the upper workings. It looks exceedingly promising, having such a great length on the line of lode carrying gold, and also to the bottom of the present workings, and the development of the lode to a greater depth is fully warranted. One of the present shafts should be selected for that purpose and continued down to 200ft. or 300ft., which would give the lode a fairly good test, and if proved payable drives could be extended both ways on its course. This would open out the mine and make a great quantity of ore available for stoping. (19-11-08.)

KLONDYKE (*vide* page 246, Record)—Adjoining and W. of Homeward Bound. The same well-defined lode traverses the whole length of the block; it consists of ferruginous calcite, is from 6in. to 18in. wide, and carries rich patches of gold and bismuth. A considerable amount of work—shaft-sinking and open cuts—has been done. No. 1 shaft, near the W. boundary, is 75ft. on the underlie, and at this depth a slight change is taking place in the country rock, similar to that in the Homeward Bound Mine, and as in the latter this has not affected the lode, which keeps quite as strong and wide as it was in the upper workings, and appears likely to continue down. At 60ft. level drives have been put in E. and W., and the ore has been stoped out to near the surface; 29 tons of this ore crushed and treated at the Government Cyanide Works, Petersburg, gave a return of 71ozs. of gold, and another parcel of 6 tons gave 13½ozs. of gold, thus proving that the lode is carrying high value for a great length W. along the line. No. 2 shaft, E. of No. 1, is down 40ft.; they are connected by drives and the ore has been stoped out between the two shafts. Nos. 3 and 4 shafts, further E., are each down 20ft. No. 5 shaft, where work is in progress, is down 50ft.. The lode is 9in. thick, carrying fairly good gold and bismuth. No. 6 shaft, E. of the last and within 150ft. of the Homeward Bound boundary, has been sunk 50ft. The characteristics of the lode are similar in all the mines on the line; the gold occurs in rich patches associated with bismuth, the other parts of the lode being of low grade. In all the bottom workings the lode maintains its usual width, and looks promising and likely to continue to a great depth. The sinking of the underlie shaft should be continued to prove the lode to greater depth, as the mine fully warrants it. Four samples taken from various parts of the mine gave the following results:—No. 1, 4dwts. of gold per ton; Nos. 2 and 3, 1dwt. each per ton; No. 4, picked sample, from one of the patches, gave 47½ozs. of gold per ton. (19-11-08.)

COCKBURN COPPER MINE (Mutooroo West) (*vide* page 98, Record, and page 2, Review No. 8).—A large sulphide lode formation traverses the property, bearing nearly N. and S., dipping sharply to the W. Two shafts have been sunk on the lode, about 200ft. apart. No. 1, or main engine shaft, is 160ft. deep, and at that level driving S. is in progress on the hanging-wall portion of the formation. The drive is in a total distance of 143ft. The formation which was cut through shows a width of 22ft., and consists mostly of iron pyrites, a little quartz, and patches of rich yellow ore. All along the drive the lode looks encouraging and likely to improve in value at depth. About 200ft. from No. 1 shaft No. 2 or S. shaft has been sunk 157ft. 6in. on the underlie of the lode, and at that depth driving N. is carried on, following the hanging-wall to meet the S. drive from No. 1 shaft. The drive is in a total distance of 17ft.; the formation is wide, but the portion operated on at present is of low grade. A sample taken from the ore broken in the face was assayed at the School of Mines and gave 0.9 per cent. copper. About 40ft. more driving will connect the two drives, and when that has been done there will be good ventilation in all parts of the mine, and a large block of ore between the two shafts will be made available for economical stoping. The lode from the sur-

face and through all the workings is very consistent and strong, and appears likely to continue down. The patches of yellow ore in the formation are more frequent at the present level than they were in the upper workings, so it is quite possible that the lode will contain much better value in copper deeper down; and, as far as can be judged from the present workings, the mine is well worth being developed to greater depth. The present shaft is well situated for deeper sinking, and being equipped with good winding plant, it should be continued down. (24-11-08.)

POONA (*vide* page 120, Record, and page 29, Review No. 8).—The mine has been unwatered down to the bottom level, 283ft. from the surface, and the S. crosscut cleaned out and extended 5ft., making the total distance 80ft. from the drive. At that point the S. lode was intersected and a connection made with the old underlie shaft sunk on it. At about 30ft. up the shaft has fallen in and is closed up with timber and mullock, so at present there is no possible chance of getting to see what has been done on the S. lode in the higher workings. At the 283ft. level the only work done on it is a drive W. for a distance of 115ft. The formation in the drive for the first 85ft. is from 3in. to 6in. wide and comparatively of no value, and at that point a fault in the country crosses the drive, striking N. and S. and dipping E. W. of the fault it appears that a bunch of ore was met with, and a considerable amount of work has been done for a distance of 30ft. from 3ft. to 6ft. wide in the bottom of the drive, but to what depth it has been worked down I cannot say until the water has been taken out, which work was in progress at the time of my visit. On the N. lode a drive has been extended from the present working shaft E. for a distance of 90ft., where the lode is well defined, and from 2ft. to 3ft. wide, of quartz, with a little yellow sulphide through it. For the last 10ft. of driving there is a decided change for the better in the lode, both in width and value, the whole formation being thickly impregnated with high-grade yellow ore. This drive should be extended to intersect the large body of ore met with in No. 3 level, 170ft. E. of the shaft, which looks promising and likely to be highly payable in the sulphide zone.

No. 3 Level (223ft. from Surface).—A drive has been extended W. on the course of the N. lode for a distance of 110ft., and at a distance of 10ft. from the shaft a fault, striking N.E., crossed the drive, and for the last 90ft. the driving has been done in country rock. The drive E., opposite the last, has been extended for a distance of 170ft. The lode all the way in this drive is well defined, and consists of quartz from 3ft. to 8ft. wide, impregnated with carbonates. The face of the drive has been connected with the winze sunk on the lode from No. 2 level. The lode both in the drive and the winze looks promising, and should pay with concentrating plant on the mine. (9-12-08.)

CHINA STONE AND CLAY, KANGAROO ISLAND.—Situated 9 miles from Hog Bay. Silica shaft has been sunk to a depth of 20ft., through soft alluvial clay and sand, necessitating the shaft being timbered from top to bottom. At the 20ft. level a drive has been put in 20ft., on what appears to be the footwall portion of a large formation of silica. In the face a drive N. across the formation, a distance of 15ft., is in solid white quartz of 98 per cent. silica, with soft decomposed seams in the joints and floors. The formation appears to be of great width, bearing E. and W., with slight dip to the N., from which great quantity of material can be obtained at shallow depth and cheaply. About 6 chains S.W. of Silica shaft a considerable amount of work has been done by open cuts and shallow sinking on a large formation of felspar, china clay, and silica, in which some fair patches and pockets of tourmaline gems have been obtained. About $\frac{1}{2}$ mile from last workings an open-cut has been excavated, 40ft. by 40ft., disclosing a bed of fireclay, from 8ft. to 10ft. thick, which has every appearance of extending a great distance in all directions. This bed appears of first-class material for making firebricks. Both the fireclay and silica deposits are extensive, and will supply the works for years. The whole of the plant on the property is up-to-date and in first-class working order. The bricks made are of excellent quality, but, owing to the demand for local-made bricks not being great at present, the plant is only working one and a half days per week, turning out about 5,000 bricks, while, with better demand, the output would be 30,000 bricks with very little extra expense. With larger trade the undertaking would undoubtedly pay well. (15-12-08.)



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